Educator Evaluation of Academic and Social Competence in Students with Acquired Brain Injury (ABI) Relative to Assessed Performance and Sense of Belonging

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Abstract

Acquired brain injury (ABI) is the leading cause of death and disability amongst children and adolescents andpresents itself with challenges associated in cognitive, social, emotional, and behavioural domains. These changes may interfere with academic performance and social inclusion, influencing self-esteem and personal success. The current study examined a subset of data to capture the sense of academic and social belonging for students with ABI as a function of the classroom teachers' subjective perception of ability, their ABI knowledge, and student identification. Overall, a discrepancy was found between educators' subjective ratings of student performance and students' neurocognitive capacity. Educator knowledge and identification of ABI influenced student success in academic and social domains independent of teaching approach. This research has implications for the identification of ABI in the classroom and related challenges students experience. Educators are underprepared for the reintegration of students returning to school and lack appropriate knowledge and strategies to accommodate individual needs.

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CHAPTER ONE: THE PROBLEM

This research investigates the sense of academic and social belonging in students with acquired brain injury (ABI) as a function of the classroom teachers' subjective perception of ability, and compares those competencies with more objective performance measures. This research consists of data that are derived from a larger collaborative project (Good et al., 2012) investigating variables that predict successful return to school for students with acquired brain injury (ABI). School aged students who reintegrated into their school community at least 2 years after sustaining ABIwere examined in relation to academic and social competence as well as socialinclusion. Variables surrounding injury severity, academic and social competence pre- and post injury, as well as the presence of an Individual Education Plan (IEP) or other reported measures of academic performance since the ABI were collected from the students families, and school records. Students participated in both standardized and nonstandardized assessments to evaluate reading, writing, arithmetic, and oral communication skills in addition to completing behavioural and life satisfaction assessment scales. Each student then identified a teacher who they felt knew him or her best. These teachers were asked to provide information on the student's scholastic and social competence as well as their knowledge and expertise with ABI.

The goal of this research was to examine the relationship between teacher knowledge about ABI and their academic and social ratings of students (with ABI) as related to the teachers' overall orientation toward inclusive practice in school settings. This research will have implications for strategies that will assist in the examination of the extent to which educator knowledge can predict future academic and social success

within inclusive settings. The research problem, study purpose, and theoretical frameworks underlying the importance of this research are the premise of this chapter.

Background of the Problem

Acquired brain injury can be both nontraumatic and traumatic in nature. Traumatic brain injury (TBI) is noncongenital and involves the interruption of consciousness and/or neurological functioning resulting from any type of external force (Blosser&DePompei, 2003; Menon, Schwab, Wright, & Maas, 2010). In combination with rotational forces of the head, the acceleration and deceleration of the head in space when struck against in blunt force trauma (e.g. whiplash, direct force, etc.) can cause alterable and irreversible physiological damage by diffuse axonal shearing (DAI) in the brain (Cicerone, Levin, Malec, Stuss, & Whyte, 2006) that disproportionally affects white matter in the frontal cortex (Povlishock, 1993 as cited in Cicerone et al., 2006) and disrupts information processing of many cognitive pathways, ultimately having an effect on development, learning, and behaviour. The annual incidence of TBI is 6 times greater than HIV, breast cancer, multiple sclerosis, and spinal cord injuries combined; and children between the ages of 0 and 20 years of age have the greatest likelihood of sustaining a TBI when compared to the rest of the population (CDC, 2004).Of this, males comprise a greater annual number of reported emergency department visits when compared to females. According to emergency department reports, falls (35.2%) and motor vehicle collisions (17.3%) comprise over 50% of TBIs in the United States annually while being struck against (16.5%), assaulted (10%), and “other” (21%) accounted for the balance of reported annual emergency visits (CDC, 2004). In Ontario, falls and motor vehicle collisions account for 75% of emergency room visits, and in

children 41% of hospitalizations for TBIs are due to falls (Colantonio,Croxford, Farooq, Laporte, &Coyte, 2009).

Since children and youth are most vulnerable for sustaining a TBI and DAI is prevalent the frontal cortex, it is important to understand the effects of TBI on frontal lobe function and its role in developing students with respect to thinking, learning, and conceptualizing information. The frontal lobe is responsible for executive functions such as planning, reasoning, decision making, monitoring, inhibiting, activating, working memory, and so on, and contains projections facilitating the transmission of information to other neural areas responsible for all functioning (Lezak, Howieson, &Loring, 2004). Since the frontal lobe is highly specialized and continues to mature and grow in size up to 17 years of age (Giedd&Rapoport, 2010), physiological impairment such as DAI as a result of TBI may lead to disruption of function for children and youth who recover from sustaining such physiological trauma.

TBI can affect several domains of functioning and interfere with cognitive processes. Depending on the site of injury, behavioural outcomes can vary, but overall higher order cognitive processes such as motivation, initiation, planning, and decision making are affected (Halliwell, Comeau, Gibb, Frost, & Kolb, 2009). TBI has been reported to cause neurocognitive stall in higher order skills, particularly for skills that involve synthesizing detailed pieces of information into a greater concept or context (Gamino, Chapman, & Cook, 2009). Due to the nature of the frontal lobe and its role in higher order cognitive processing, as well as involvement in the memory systems, children who sustain TBI at a young age experience great difficulty with global processing (e.g., understanding the big picture; also referred interchangeably in the

literature as gist based learning, macrolevel processing, and strategic learning) and the organization of detailed information (Brookshire, Chapman, Song, & Levin, 2000; Chapman et al., 2004). These higher order cognitive skills play an important role in literacy, namely reading, writing, and academic learning, as well as in social interaction. Students with ABI who exhibit reading challenges may do so as a function of greater cognitive impairment (Lezak et al., 2004). There is a misconception that the young brain equivocates to a resilient brain (Sonnenberg, Dupuis, & Rumney, 2010). Neurodevelopment is interrupted in children who have sustained a TBI, and the development and recovery of physical abilities are often superseded by cognitive abilities(DePompei& Bedell, 2008). Therefore, without a physical or observable marker of impairment, children and youth may not appear to be experiencing difficulty, yet struggle scholastically as well as with autonomy and social conventions.

Frontal lobe impairment has a tremendous impact on academic and social achievement for students with ABI. Regardless of age and degree of injury severity, long-term academic success is challenging for students with TBI. These children demonstrate poor social outcomes with little evidence of recovery without adequate support, with the exception of improved neuropsychological and social information processing abilities (Catroppa et al., 2009; Yeates et al., 2004). Chapman et al. (2004) identified that early onset of TBI affects long-term cognitive ability, particularly for skills that have not yet fully developed. For example, students injured in early childhood relative to those injured in later childhood experience greater difficulty with reading later during theiryouth, potentially in relation to disrupted physiological development (Catroppa et al., 2009). Behavioural dyscontrol as a function of impairment influences how students with ABI are

perceived by members of their classroom community and may result in poor psychosocial outcomes and decreased sense of belonging and school connectedness (Waters, Cross, & Shaw, 2010). Under- or overestimation of academic performance has an impact on long-term success for students with ABI. Similarly, impaired academic and social competence have implications for overall quality of life.

Ongoing rehabilitation, monitoring, and service planning for careare required for individuals with, and recovering from, TBI (Zasler, Katz, &Zafonte, 2007). Due to the lack of transitional and supportive services, families and educators are expected to fill the role of implementing strategies and resources for successful rehabilitation; however, they lack the adequate knowledgeabout injury, recovery, and function to do so effectively(Glang et al., 2008; Mohr & Bullock, 2005; Todis & Glang, 2008). Due to lack of knowledge translation from the tertiary care setting to the home and school communities, parents reported that providers no longer considered or defined their child as a whole person but rather a person of diminished ability and, further, described educators to believe that students were exaggerating symptoms and behaving in a lazy fashion. In order for students to successfully begin to recover, parents and other support systems such as those found at school need to be incorporated as part of the plan (Ylvisaker et al., 2005) so that students recovering from TBI will have optimal recovery and developmental outcomes.

Academic success and social competence are skills predominately mastered during childhood in the school community and foster later vocational opportunities. Students are likely to excel in academic mastery goals when receiving academic support as opposed to feeling evaluative (Régner, Loose, & Dumas, 2009). It is important for

educators to be aware of how injury and trauma can result in traumatic neurobehavioural sequelae and respond to students as a whole so that theymay be successful in all domains of functioning, particularly in circumstances over which students have little to no control (Sitler, 2009).

Without a classification, the likelihood that educators are underprepared to transition students back to the classroom is greater. Students who were in the regular class preinjury will likely return to the regular classroom setting postinjury.Without the advocacy of the parent and clinical team to identify learning needs and changes in their student's life that might affect learning, thestudent's challenges with transition might be mislabeled as a behavioural/conduct problem, learning disability, or developmental delay(Bennett, Good, & Kumpf, 2003).Alternatively, they may not receive services at all (Glang et al., 2008). In either case, students and families rely on educators as the primary judge of performance and competence in school; however, the accuracy of their perception of capacity may be contingent on the level of knowledge educators possess about ABI. In sum, transitional services are required to reintegrate students to the regular classroom setting, and educators rely on family and medical teams to provide information to otherwise identify students with ABI in the classroom for adequate evaluation and progress monitoring, as their familiarity with ABI is sparse despite its prevalence.

Statement of the Problem

Children and youth are surviving serious injuries, and recovery is long term. The United States recognized TBI in 1990, and federal law mandates were implemented so that the educational needs of students with TBI could be met (Zasler et al., 2007). TBI is identified under the Individuals with Disabilities Educational Act (IDEA). However,

unlike the United States, many provinces in Canada do not have guidelines established for the identification of students with ABI, let alone services available in school. Ontario, as the most populated province with approximately 13.5 million inhabitants, has access to the greatest number of health care resources in the country; however, ABI is not identified by the Ministry of Education as an exceptionality within the provinces school system. The Ministry of Education has five categories of exceptionality which include behavioural, communication, physical, intellectual, and multiple classifications (Bennett &Dworet, 2008).

In part as a result of this lack of official recognition of ABI, many educators are unaware of the effects of ABI on learning and socialization (Hux et al., 2010). Compounding this is a lack of trainingat the teacher candidate and professional development levels for educators from both the educational and health care systems(Todis & Glang, 2008). In December of 2012, the Ministry of Education for Ontario, Special Education Policy and Programs Branch, released a memo that clearly suggested that the existing categories of exceptionalities for the province should be considered broadly and are not intended to exclude medical conditions (e.g., ABI) and, as such, students ought to be recognized and accommodated (Finlay, 2011). Early recognition, intervention, and planning are important for improved rehabilitation and outcomes. Teachers and school personnel often do not feel adequately prepared to provide academic and social support(Begeny et al., 2011; Bullock, Gable, & Mohr, 2005). Returning to school is far from an easy process and requires appropriate timing, assessment, planning, and support(Dikmen et al., 2009).Without the knowledgebase concerning TBI and its sequelae on outcome and development, educators are not only

underprepared for these students in their classroom, theyare also poor judges of performance for the affected students(Roscigno & Swanson, 2011; Todis & Glang, 2008). Under- or overestimating performance on scholastic and social skills can have academic and socioemotional implications for the student with ABI reintegrating back to the school setting.Students may continue to struggle with environmental demands and social expectations, further experiencing emotional and inclusive challenges thatmay negatively affect both reintegration and later academic and postacademic outcomes.

Research Objectives

This research aimed to identify whether educators of students with ABI are subjectively accurate at discriminating reading, writing, arithmetic, and oral communication abilities in their students relative to their performance on standardized and nonstandardized measures and whether those judgments are accurate as a function of knowledgebase pertaining to ABI. Similarly, it is of interest to investigate whether accurate judgment of ability is associated with knowledge of ABI in the classroom paired with the students' self-report of academic and social belonging/inclusion.

Rationale

The rationale underlying this research is the necessity of examining the impact of educators' knowledge (or lack thereof) about brain injury in the Ontario school system. Despite the high incidence of ABI, educators are underprepared to assess, evaluate, and provide necessary remedial strategies which will not only facilitate the successful return to school for students with ABI but also permit them to recognize their influence on the long-term outcomes of student success. The results of this research will contribute to both the educational and psychological literatures and knowledge regarding the academic and

psychosocial effects subjective classroom evaluation has in relation to objective measures of capacity and what the possible discrepancies might mean for long-term success in students with ABI.

Theoretical Framework

Physiological changes occur at the cellular level as a function of injury type (e.g., sheering force injury vs. focal lesions vs. ablation), neural plasticity due to experience throughout development, as well as enriched environments(Giza, Kolb, Harris, Asarnow, & Prins, 2009).Since experience and environment play an integral role in recovery,it is important that students returning to school receive remedial benefits from their school environment.Since neural development is ongoing until 25 years of age (Pasino, 1996), environmental experiences, particularly those that occur at school, will be most beneficial in a child's development and will foster both academic and interpersonal learning. Similarly, educators at school are the best resources and support for students and can, with the appropriate knowledge, be active in the recovery process. Lack of educator knowledge and awareness of ABI in the classroom could potentially have a negative impact on learning and development, particularly if students who return to school are unidentified and as a result lack appropriate resources. In determining teaching methods and strategies, educators must be aware of the domains in which students with ABI can learn at the same pace as their cohort,in addition torecognizing when accommodations and/or adaptations need to be implemented.Accommodations and adaptations often require revisions based on ability to achieve educational goals, and this requires communication from a variety of resources in the student's life (Cohen, 1996, Zasler et al., 2007).

Scope and Limitations of the Study

This study examines the relative contributions knowledge about ABI and identification has on students' academic and psychosocial function. Measures of academic and social competency are evaluated as a function of knowledge and its effect on academic, social, emotional, and behavioural outcomes for students reintegrating to school. This research can be generalizable for student populations with ABI; however larger sample sizes could be used in the future. In addition, it should be noted that this is not a heterogeneous sample. ABI has a variety of effects on learning and behaviour, and injury severity should be considered. Further, representative sampling (province wide) accounts for a variety of educational approaches used across the province.

Definitions and Key Terms

*Acquired brain injury (ABI)*refers to any injury, disease, infection, or trauma that results in damage to neural tissue. ABI can be traumatic and nontraumatic by description. Nontraumatic brain injury may result from infections, stroke, axonic injury, metabolic disorders, tumor, and inhalation of toxic substances (Blosser&DePompei, 2003).

*Traumatic brain injury (TBI)*can be open (direct impact resulting in penetration) or closed (nonpenetrating). TBI is prevalent amongst young individuals, is disabling, and as a result interferes with daily living, development, cognitive function, learning, independence, and vocational, academic, and social skills.TBI and its symptoms can interfere with biochemical processes such as emotional, homeostatic, and other regulatory systems, and are often associated with changes in personality, mood, and neuropsychological competence. Individuals with TBI may experience changes in motivation, awareness, initiation, and related executive functions mediated by the frontal

lobe. TBI severity ranges from mild to severe and is often diagnosed and characterized by loss of consciousnessas screened by the Glasgow Coma Scale Rating Scale, duration of consciousness lost, and posttraumatic amnesia (Blosser&DePompei, 2003; Iverson & Lange, 2009; Zasler et al., 2007).

*Executive functions*refers to the self-serving behaviours and abilities that permit independent and successful engagement with the environment (Lezak et al., 2004) mediated by the frontal lobe (Blosser&DePompei, 2003). Functions include self-monitoring and self-control, emotional regulation, and goal-directed behaviour such as planning, initiation, and abstract thinking (Ogden, 2005).

*Social competence*consists of appropriate and positive social relations and cognitions with others utilizing effective social skills in the absence of maladaptive behaviours (Wong, 1998). Social competence utilizes emotional knowledge to interact socially and respond appropriately to social convention and in social situations (Feldman Barrett & Salovey, 2002).

CHAPTER TWO: REVIEW OF RELATED LITERATURE

Brain injury can influence learning and development in a variety of ways. It is important that educators are aware of the cognitive, emotional, and behavioural sequelae that occur as a function of brain injury, so that classroom support and evaluation can be appropriately provided. The effects brain injury has on academic and psychosocial reintegration will be reviewed in this chapter.

TBI and Cognitive Processing

TBI has been reported to cause neurocognitive stall in higher order skills, particularly for skills that involve synthesizing detailed pieces of information into a greater concept or context (Gamino, et al., 2009). Brain injury severity is related to cognitive and neurodevelopmental deficits as evidenced by performance on neuropsychological measures and shortfalls in language and its use up to a year postinjury, particularly forinjuries sustained in early childhood, due to the susceptibility associated with being injured during neurodevelopment (Gerrard-Morris et al., 2010). Due to the vulnerability of the frontal lobe and its role in higher order cognitive processingas well as in memory and learningsystems, children who sustain TBI at a young age experience great difficulty with academic ability and social competence.

Frontal lobe impairment has a tremendous impact on academic and social achievement for students with acquired brain injury. Regardless of age of injury and degree of injury severity (Catroppa et al., 2009), long-term academic success is challenging for students with TBI. Children with TBI demonstrate poor social outcomes, with little evidence of recovery with the exception of improved neuropsychological and social information processing abilities (Yeates et al., 2004). Chapman et al. (2004)

identified that early onset of TBI affects long-term cognitive ability, particularly for academic and social skills which have not yet fully developed. For example, the ability to synthesize detailed information into a general overall meaning or concept is more difficult for early onset of injury when compared to late onset of injury, suggesting that the cognitive skills necessary for these executive/higher functions are developed later in adolescence. Depending on the injury, other areas of course may also be implicated in having an effect on functional and cognitive outcomes; however the frontal lobes are of particular vulnerability due to their location and size.

Parents of children with TBI are most distressed and concerned for their return to school and futurewith respect to related performance both scholastically and socially, reporting a decreased number of friendships(Prigatano & Gray, 2007). A students scholastic performance in school is largely evaluated by the student'seducators and, as such, the evaluation process is instrumental in determining how the student is succeeding in school relative to his or hercohort, and the evaluation is an indication of later student success in later academic and social constructs. In turn, reviewing educator perception of academic and social competencemight influence evaluationand thus is important to consider relative to student ability.

Teacher Perceptions of Academic Competence and Functional Outcome

The educator has an important role in the classroom that extends beyond that of didactic instruction. Providing lessons involves extensive planning, organization, instruction, monitoring, and judgment on the teacher's part to accommodate the variety of learners and determine whether students are capably understanding and retaining the material. With the variety of learners in the classroom, it is at the teachers' discretion to

determine whether fundamental knowledge is grasped, and oftentimes this is done through formal and informalassessment at either the classroom, board, or in some jurisdictions provincial/state level. The educators' judgment is important in determining how students will excel academically and socially in and out of the classroom as well as in subsequent grades. Time restrictions, policy, and lack of knowledge, amongst a variety of factors, may influence the extent to whichteachers are accurate in their perceptions when compared to students' capacity(De Bortoli, Arthur-Kelly, Mathisen, Foreman, & Balandin, 2010).

The school environment provides students with the opportunities to learn scholastic material set out by the curriculum which applies the versatility of neurocognitive functions such as planning, reasoning, and cognitive manipulation of informationthat facilitate learning across a variety of academic and social domains. These skills develop early in learning and are the building blocks and foundation of later learning and maturity. It is expected that students' classroom performance, as evaluated by their teachers,is a reflection of their competence,academic outcomes,and abilityto later lead an independent lifestyle based on their age and grade-based skills. It is for these reasons that the accuracy in perception of performance and capacity is important. Since classroom assessment is in part a subjective process and related to observed classroom behaviour (academic, social, cognitive), it is important educators have the knowledgebase to recognize changes occurring as a function of developmental milestones as opposed to an exceptionality. Objective measures of academic and cognitive performance can be assessed using standardized test measures whichcompares performance to age- and grade-based norms. However, they can not realistically be administered to all students who

appear to be struggling in one domain or another. Factors such as limited availability, administration restrictions, and overall feasibility can influence whether standardized test measurements are part of the overall assessment of students. It may be argued that standardized assessments of students are inherently biased and not reflective of their abilities in an authentic context, yet standardized tests are a valid measure of what a student is capable of doing within the context of the norms of that test, and this provides insight to the greater picture of how he or she is functioning and managing throughout various stages of development.Often schools rely onthe subjective and skilled experience of the teacher to determine the student's capacity across domains of functioning. While classroom assessment can be considered subjective in nature, educators spend the majority of the day interacting with their students and, as such, acquire experience and insight to behaviour and personality that may not otherwise be measured through standardized testing. Therefore, classroom environment, culture, and interactions can, and indeed should, influence the accuracy of judgment and evaluation.

Despite educators' familiarity with their classroom, and individual differences, there are circumstances in which educators' predictions underestimatestudents' academic performance.Begeny et al. (2011) compared student performance on standardized measures (DIBELS Oral Reading Fluency) of reading ability, more specifically oral fluency, to their respectiveteachers' judgment of performance. For the most part students were not identified with exceptionalities or required additional educational services (with the exception of 7% of students, n=212). Results demonstrated that although teachers were able to identify students at risk, they significantly overestimated the performance of low and average readers and, not surprisingly were more accurate at discriminating good

readers. Inaccurate teacher judgments in this study were attributed to inadequate trainingand time spent observing needs.

Accurate judgment of student performance may be dependent on a variety of factors including experience, philosophy, and training (Seniuk & Good, 2008; Zinga, Bennett, Good, & Kumpf, 2005). For determining the abilities of able students in nonnormative tests, teachers are fairly good at judgingstudent abilities in math and reading; however, when asked to comment on performance on standardized measures of math and reading fluency set out by a researcher,teachers had the tendency to overestimate performance and were better able to determine frustration levels than skill mastery(Begeny et al., 2011;Eckert & Dunn, 2006).

Influential Factors in Student Evaluation

In addition to individual variables associated with each student, variables associated to the educators, such as knowledgebase, are also influential in classroom evaluation. In a study examining teacher knowledge and attitudes of ABI, Seniuk and Good (2008) found that of 37 pre-service teachers interviewed, only 27% demonstrated knowledge about ABI. After a brief training session on the implications ABI had on learning outcomes, posttest analysis revealed that training was sufficient in increasing knowledgebase and attitudes towards students with ABI. This was evidenced by 87% knowledge retention after a one-month follow-up.

There may be other factors aside from lack of formal training that contribute to lack of assistanceavailablefor students,such as awareness and attitudes, time, and policy constraints.Educator judgment of ability may vary as a function of the student's learning rate in the classroom. For example, teachers who have a class predominately comprised

of students who struggle with developmental and academic challenges may rate ability relative to one another, compensating for perceived disadvantages, and adjust grades or expectations based on the individual or cohort (Martínez, Stecher, & Borko, 2009). Moreover, the nature of evaluationcan influence how judgments are formed and may vary across educators. Teachers who evaluate based on provincial or state testing demands/criteria may rate students' abilities relative to expectations and to their previouscohort's performance. Alternatively, when evaluation is based on a variety of performance measures such as achievement on in-class tests, quizzes, assignments, group work, and other in-classroom competencies such as motivation and engagement (Martínez et al., 2009), better indices of academic achievementcan be made.Alternatively, since educators spend a great deal of time with students directly, it is plausible that they might feel most familiar with the students and will support, or are comfortable with, the strategies and approach that work for them despite receiving additional information about the student's needs. De Bortoli et al. (2010) conducted a literature review examining teacher knowledge and awareness of needs for students with multiple and severe disabilities at school and found that teachers who were provided with knowledge and skills to improve communication with children did not apply it later.

Although there are several factors that contribute to the estimated accuracy of teacher ratings on student ability, student-related factors such as age, sex, learning difficulties, and classroom behaviour also contribute to education outcomes for learners, particularly those with neurodevelopmental compromisesuch as brain injury. Literature on teacher judgment based on student characteristics demonstrated that teachers' opinions of future academic success were based on sex, behaviour, and cooperativeness to task

(Tournaki, 2003). Tournaki (2003), observed that teachers rated students who read with minimal difficulty andwithout an identified label or “disability”to have lower academic success whengood reading was coupled with uncooperative misbehavior.Similarly, and not surprisingly,greater academic success was predicted for cooperative students without reading difficulty. This research also demonstrated that inattentiveness anduncooperative behaviours influenced perceptions of futureacademic and social successmore so for boys and than girls and for uncooperative students in general. Students who displayed appropriate and scholastic behaviours were rated/judged to have successful future academic outcomes relative to those who were academically competent but misbehaved. Reading level alone did not predict judgment, suggesting there is a propensity to pass judgment on social characteristics that influence predicting the success of the student independent of his or her skill level. This social judgment can potentially place students academically and socially at risk, especially if judgment influences classroom and academic evaluation.

Classroom Support and ABI

Catroppa et al.(2009)investigated age and severity of injury as a predictor of long-term educational outcome in students with TBI, 7 years postinjury. Between and within group differences were not found irrespective of age, with the exception thatstudents injured laterin childhood (8–12 years of age) had better reading performance when compared to children injured earlier in childhood (3–7 years of age) suggesting that resiliency in regaining function is predominately independent of age at injury onset; however age at time of injury predicted later reading competence. In addition, factors contributingto poorer arithmetic, reading, and spelling performance wererelated to low

intelligence scores and injury severity. This research contributes to the understanding and role executive functions have on learning new informationand the extent to which age and injury severity mediate outcome. Reading is a skill developed early in childhood involving visuospatialprocessing, phonological decoding, working memory, and related higher order cognitive skills which become automatized with experience, and is retained for those who learn to read and sustained ABIlater in childhood. When age of reading acquisition and masterytook place postinjury, learners experienced greater difficulty, which may be attributed to reduced cognitive agility as a function of injury. Earlier neural disruption increases the level of difficulty children experience during skill mastery, presumably due to interrupted cognitive development and function.

Other factors such as previous peer networks, social and academic supports, and school transitioning may play roles in academic outcomes (Glang et al., 2008).Todis and Glang(2008) investigated the effects of high school experiences and transitional support during postsecondary studies for students with TBI. Internal and external factors were investigated to determine which factors were most influential in the successful transition. Eighty-nine students and their parents participated in an unstructured interview and observation along with friends, family, and peers who knew the students best. Participants injured prior to high school received special educational supports in reading, writing, and arithmetic during their early school years with the support and advocacy of family. Of those,approximately 70% did not continue to postsecondary programs. It is noteworthy to mention that nearly half of this studentpopulationwas placed in specialized life skills programs upon entering high school which were less focused on academics and more focusedon vocational skill building. The majority of students identified received

additional support from the learning resource center. During theirstudies, students were offered the option of utilizing only or either the learning resource center or life skill program, both of which do not offer the expertise of teaching students with ABIor addressing the cognitive challenges associated with learning. Students in the life skills programs were offered additional secondary school credits that could contribute to graduating or college programs, whereas the academic based students with additional support from the learning resource centerwere not offered the same credits. Despite the program type,student cohorts recognized the peers with TBI to be more unique and, as such, treated differentially. Further, students without a visible disability did not qualify for needed services for the reason that test scores on academic functioning wereat or above grade level despite identified struggles. Parentaladvocacy may not have taken place, and/or awareness of available services was not apparent,leaving the student, unidentified.

In light of the aforementioned research (Todis&Glang,2008), it may be suggested that schools and faculty in some cases have done students with a disservice by moving them forward with additional credits and minimal remedial support.Students in life skills or related vocational secondary programs who wish to continue to postsecondary studies are oftenrequired to take additional courses to meet college level literacy and math standards, but are unable to meet academic expectations due to lack of resources and services to optimally succeed(Roscigno & Swanson, 2011; Todis & Glang, 2008). Continuing higher education also requires motivation, which many students may lack due to injury;therefore of those students with ABI who continue to secondary or postsecondary studies, it is uncertain how many successfully complete their programs due

to reducedmotivation andpoorexecutive function, success,and cognitive flexibilitywhich requiredfor managing coursework effectively.Specialized vocational preparation programs may have both strengths and weaknesses, butdo not ensure the successful academic or psychosocial outcomes for individualswith learning challenges as a function of physiological disruption—since the challenges associated with ABI extend beyond those of concrete learningoverlap with day-to-day social interaction. Students without services or acknowledged challenges may not receive the necessary support to accommodate all modalities of reintegration (physical, academic, psychosocial) and subsequentlymay not thrive vocationally despite knowledge acquisition and academic skill, since other cognitive facets that contribute to vocational success (e.g., initiation, organization, planning, fatigue, emotional disruption, etc.) remain compromised.

Quality of Life

Sustaining a childhood TBI has developmental long-term and lifelong repercussions on functional outcomes, not only for education but also for quality of life. Although many students receive some form of support (familial, peer, school resources, etc.) to facilitate the completion of educational studies, voids continue to exist for students with ABI in terms of personal satisfaction with quality of life. Anderson, Brown, Newitt, and Hoile (2009) conducted a research study on educational, vocational, and psychosocial function and perceived quality of life. Individuals between the ages of 18 and 30 years who sustained a TBI at 0–16 years of age and their respective parents participated in the research. As expected, and consistent with earlier research (Catroppa et al., 2009; Sonnenberg et al., 2010),adults who sustained a TBI during childhood performed more poorly than the population across domains, with worse outcomes as a

function of increased injury severity. Social economic status (SES), social network, and environmental factors were influential in determining educational and psychological outcomes later in life. Findings revealed that individuals who sustained a childhood TBI were 3 times less likely to complete secondary studies despite educational attainment similar to that of their cohort, and required educational support. Adults with a childhood TBI were also over 2 times less likely to continue with postsecondary education relative to their peers. Overall, other variables influence quality of life andmediate academic and psychosocial success. Academic and future success for individuals with ABI is vulnerable to negative outcomes due to lack of assessment, evaluation, knowledge, and informalsupport (Ylvisaker et al., 2005).

Vocationally, individuals in the study were nearly 2 times more likely to find substantial difficulties obtaining employment and at attaining skills that may facilitate a skillful career, and psychosocially had a lower quality of life (Anderson et al., 2009). The incidence of TBI increases the amount of time off between injury and work than most other injury types. TBI lessens the likelihood comparableopportunities for employment postinjury will be attainable atpreinjury capacity and reduces the chances a person will resume his or her position at his or her previous competency. Similarly, TBI affects daily living, independence, relationships, and overall quality of life.

Since brain injury is acquired, students have a sense of loss of function despite its often being unrecognized academically by their teachers. Despite under- or overestimated judgment on reading abilities and other academic domains, school success for students is measured by their ability to achieve personal goals and not graduating high school per se,

particularly since graduation was viewed as a milestone of success and preparedness for the real world or continuing education (Todis & Glang, 2008).

Social Competence

Social competence for the purposes of this research refers to the level of ability with which individuals are able to use emotional knowledge to interpret and respond appropriately to social convention and daily social interaction. Emotional knowledge in this case includes the ability to correctly label emotional expressions, identify emotionally provoking situations, and infer the causes and consequences of those situations (Feldman Barrett & Salovey 2002). Emotional knowledge is developed throughout the lifespan; however, is predominately attained during childhood in conjunction with executive higher order cognitive processes such as theory of mind (e.g., the ability to perspective take), inhibition, and reflective thinking. Emotional knowledge is a complex competency for which one develops an expertise forbased on experience. Emotional knowledge requires translating complex information of facial expression, body language, vocal tone, pitch, language, amongst other observable and nonobservable (e.g., perception of others' cognitions) characteristics to discriminate emotion and feeling and their role based on situation (Feldman Barrett& Salovey 2002).

Emotional knowledge and its application in social settings is important for social competence since children who are able to discriminate how their peers are feeling and respond appropriatelyare also able to determine cause and effect relationships between emotion and social context (e.g., If I behave this way, she will respond that way). Developing age-appropriate social competence facilitates social inclusion, acceptance by peers, and ultimately is a construct that fosters friendships and positive interactions.

Without emotional knowledge to respond in a socially competent fashion, individualsmay encounter embarrassment, ridicule, and ostracisms, which will negatively spiral into the domains of self-esteem, self-worth, loneliness, and/or other destructive cognitive manifestations. Since social competence is developed based on factors such as emotional knowledge and the development of executive functions, school culture and the classroom provide the ideal environment to foster the growth of socioemotional competence. Time of injury may influence the extent to which a child develops higher order cognitive (frontal lobe) processes to interpret emotional information. Despite neural plasticity, children 4 years of age and youngerwho were hospitalized and received tertiary care have poorer social, emotional, cognitive, and physical outcomes 4 years postinjury. For children who sustained an injury during preschool years, poorer social and cognitive outcomes were exhibited at 8 years of age when compared to those injured later in childhood. No differences in age groups were evident for emotional adjustment (Sonnenberg, et al., 2010).

Vygotsky's (1979) and Bruner's (1976) roles in the zone of proximal development and scaffolding have demonstrated that learners are more effective with the guidance and modeling of others.This is not surprising provided the supportive nature of the individual (e.g., parent, teacher, peer) in providing external assistance in the form of cueing and directing to facilitate reasoning, planning, and decision makingthat the frontal lobe is otherwise unable to do. Scaffolding uses memory recall strategies, group facilitation, and direct and indirect environmental cues to facilitate learning. This is important when considering strategies for successful return to school for students with ABI. Learning should be kept within the individuals' developmental and metacognitive states despite age

and grade level as a result of injury (Rees & Skidmore, 2008). Despite seminal theoretical frameworks, its application to populations that differ as a function of developmental compromise is not recognized. Educators acknowledge that identifying through observation and addressing socioemotional needs of their students are part of their responsibilities in the classroom; however teachers do not feel adequately prepared to do so for students with learning difficulties (Pavri & Hegwer-DiVita, 2006). Educators have expressed concern that there is a lack of knowledge pertaining to the needs of students with ABI, and despite professional development on the topic, experience working with such students was also lacking (Mohr & Bullock, 2005).

When comparing ratings of educators' perceptions of students' social, emotional, and academic functioning to self-reports of achievementin order to better understand teacher perceptions of learning difficulties(Soles, Bloom, Heath, & Karagiannakis, 2008), it was found that 77% of behaviours were externalized predominately by females, notwithstanding that males were more likely to be in special education classes. Differences in gender were not found for social skill deficits, such that boys and girls were both as likely to be rated with academic and social skill difficulties. Interestingly, teachers' opinion of social difficulties and student self-report did not coincide, suggesting students did not identify themselves as experiencing social difficulty with peers. In addition, over a third of females reported depressive symptomatology when compared to boys; however, this was not identified by the teachers. Nonetheless, as depressive symptoms increased, teachers' identification of perceived difficulties also increased. Similarly, students who exhibited clinical levels of externalizing symptoms reported having lower levels of trust and poorer relationships with their teachers, whereas, the

teachers of these students also confirmed that the relationship was not as close as those age-matched cohort without behavioural difficulty (Murray & Zvoch, 2010; Soles et al., 2008). These findingsare important and indicate that children with challenges academically and behaviorally demonstrate social skill challenges suggestive ofpoor emotional development. In students with ABI,social skills pose as challenging and leadto peer rejection; as such, other internalizing emotions should be considered and addressed.

Research examining peer attitudes towards students with disabilities in high school found that school culture was significantly related to attitude,reduced social anxiety amongst peers, and overall sense of inclusivity(Mcdougall, Dewit, King, & Killip, 2011). Although some students (21%) held neutral to negative attitudes towards peers with disabilities, the majority of students did not. Studentswere less likely to socially pass negative judgment on others with disabilities and were more encouraging,indirectly positive in interpersonal relationships, and assisted with goal achievementin schools that designedthrough policy and teacher facilitation to promote goal structure and overall learning comprehension. This suggests school culture, namely policy and teacher support, mediates student judgment. Further, positive attitude towards peers was related to greater peer support in females than males (McDougall et al. 2011). This might be for a variety of reasons but may be related tofemales generally possessing a nurturing and supportive role, or perhaps a higher incidence of disability in boys. Social standing in a peer group may be more valued than academic shortcomings.

There are several neurocognitive challenges students experience as a result of compromised neural structures that,although not visible to the naked eye, might present behaviourally. Disinhibition or the inability to “think before we speak” is associated with

ventral frontal lobe injuries, whereas dorsal injuries are more familiarly associated with initiationand social perception with right hemisphere impairment(Ylvisaker et al., 2005).

In an inclusive classroom setting, students with ABI may not be recognized as different by their peers and teachers. However, during social interactions differences in socioemotional function may be more recognizable. Students who present with behaviouraldisinhibition, aggression, or related disruptiveness and/or apparent laziness may be perceived as "different,"acting out intentionally, or as less socially acceptable. Lack of social competence and misbehavior may be attributed as a reflection of the individual rather as a function of acooccurring cognitive impairment. Poor social competence might be a function of compromised or underdeveloped executive function, an inability to monitor one's behaviour, perspective taking, and make socially competent decisionsand respectively influence social interactions and emotional responses. Overall, students are influenced by one another socially and emotionally in the classroom, and the presence of a brain injury greatly influences how the student and those in his or her environment respond. Understanding how ABI affects learning and emotion is important when teaching children and youth with ABI, and lack of teacher knowledge is not exclusive in influencing student outcomes; rather, educational policies also influence the educator's classroom practice (Glang et al., 2008; Zinga et al., 2005).

In Hawley (2004), 82 participants with TBI were interviewed alongside their parents and teachers to determine whether behavioural difficulties interfered with academic performance. Maladaptive, disruptive (e.g., aggression, arguing, violent, argumentative) and withdrawn (e.g., nonresponsive) behaviours were observed in two-thirds (up to 80%) of students and were significantly related to social deprivation. In

addition, 76% of educators reported that behavioural challenges interfered with coursework. Most interestingly, most educators were unaware the student had experienced an ABI, particularly if the injury occurred one year prior. Behavioural challenges were also associated with peer exclusion and inevitably poor academic successaffecting quality of life.

Socioemotional Development in the Classroom

The comorbidity of psychiatric disorder with behavioural presentations (including mood disorders, ADHD, ODD/CD)identified in adolescence is greater whenABI (mild through severe) was acquired in early childhood (0–5 years of age;McKinlay, Grace, Horwood, Fergusson, & MacFarlane, 2009). These findings illustrate that changes in behaviour associated with frontal lobe functioning can have serious implications for learning and require identification accordingly. Psychosocially, it was established that individuals with early onset TBI have a lower quality of life(Anderson et al., 2009). TBIsustained during childhood increases the student's chance of developing comorbid mental health-related problems (that dissipated over time)threefold, compared to his or her cohort,and affects quality of life. Although mental health risk decreases as duration postinjury increases, adults with childhood ABI are at a higher risk, twice that of the general population, to sustain comorbid psychological challenges (Anderson, et al., 2009). Temkin, Corrigan, Dikmen, and Machamer (2009) conducted a literature review that also identified long-term physical and psychosocial difficulties as being evident with severe TBI.

It is important to note, however,mood disorders, agitation, sleep disorders, and fatigue are all associated with TBI. Children are individuals with developing personalities

and sense of self; psychiatric classifications should be taken with caution, and personality type should not be misinterpreted as symptoms associated with brain injury or psychiatric condition.

Poor cognitive, academic, and socioemotional adaptability in students with ABI has the propensity to increase mental health related concerns(e.g., depression, anxiety, and learning difficulties) in school. Mental health outcomes are not well recognized, let alone identified (Malti & Noam, 2008)as a potential consequence of TBI. School climate and culture are important for development and sense of belonging for all students. Students who do well academically may also do well socially, while others will not (Malti & Noam, 2008). The extent to which students feel connectedness to school may be dependent on school size and student academic competency, particularly for intermediate students. Feelings of school connectedness are also mediated by variables such as average academic performance rates (e.g., literacy and numeracy scores), socioeconomic status, care and upkeep of school (e.g., presence of graffiti), as well as pastoral care which is largely based on homeroom ecology in terms of policy and procedure, allowing for health and well-being to take place through strategies that will improve academic care and promote emotional and social well-being and are significantly related to school connectedness (Waters et al., 2010).

Loneliness, as opposed to number of friends and companionship, may be considered an indication of dissatisfaction or inability to maintain or develop relationships. Al-Yagon and Margalit (2006)considered self-reports of loneliness, sense of coherence (whether one uses inner coping resources to manage and work through stressful situations to reduce or prevent anxiety and anger), and perception of teacher as a

secure base in school-aged children with reading difficulties. This third grade sample demonstrated reading abilities at the first grade level. In addition, all students reported their teacher to provide adequate assistance in the classroom;however, the students with reading difficulties perceived their teacher as more rejecting than students who did not exhibit reading difficulties. These findings suggest that students did not perceive their teacher as a secure base. In addition, children with reading difficulties reported greater feelings of loneliness, with poorer coping resources to draw from relative to their reading cohort. The results indicate that students who struggle academically also experience socioemotional struggles that make them unequipped to deal with potentially stress-provoking situations. In such cases, students may consequently develop anxieties (or other psychological manifestations such as depression) as well as insecurities with performance. This research also explored resilience and found that a subgroup of the sample with reading difficulties reported reduced loneliness and a high sense of coherence and rated their teachers as less rejecting.This illustrates that moderating factors such as those that may contribute to resiliency for socioemotional developmentcan contribute to a sense of inclusion. The authors recommended that interventions should be implemented at both the individual and peer levels to increase cooperation and peer relation, which may in turn, facilitate in development of stronger coping resources and reduced feelings of loneliness at a young age (Al-Yagon & Margalit, 2006).

Cognitive problems remain even when overall functioning appears to have improved and, again, outcome prognosis is worse for younger than older children with comparable injuries. Students perform better on cognitive measures when there are supportive parents and home environments (Gerrard-Morris et al., 2010). Long-term

deficits persist many years postinjury,interfering with individuals' effective participation in academic and nonacademic activities. Students with ABI are limited in the extent they can engage in activities due to lack of accommodations and strategies available to facilitate the cognitive, social, and environmental demands of participation. As such, students prefer to participate inand enjoy unstructured and modified home environments as compared to structured school environments with peers who are more capable (Galvin, Froude, & McAleer, 2010). In sum, ABI interferes with or alters cognitive processes that aid in interaction between oneself and one's environment, thus impacting overallsocial and emotional competence and capacity for inclusion.

Sense of Belonging

Sense of belonging to a group or community is important for quality of life and has been recognized as such for decades. From early childhood friendships, clubs and sport membership, and later vocational and community roles, sense of belonging was recognized by developmental psychologists (such as Abraham Maslow) and integrated into psychological philosophy of teaching to date. It is not surprising then that once the basic needs of survival can be sustained independently, the satisfaction with one's social network is an integral component ofrecuperating overall quality of life. Since recovery for children is longterm, undergoing several changes throughout development is inevitable, and a core support system to anchor and rely on is important for emotional, academic, and social success.

Return to school after injury is critical for developing academic as well as socioemotional skills that will allowstudents to become meaningful contributors later in life. Students returning to school after injury identify the urge to continue and excel in

school and return to participating in previous lifestyles. However adapting to change and receiving adequate supports are important holistic components to the successful return and self-satisfaction (Mealings & Douglas, 2010). Similarly, there are connections between observed behaviour, performance, and social skills. There are many changes both internally and externally that impact educational goals. Students without external educational support are also at a greater vulnerability to exhibit internal emotional and psychologically related clinical problems (Murray & Zvoch, 2010).

Central to their successful return, however, is the evaluation and support of the individuals in their environment, which include peers, family, and educators. Mealings and Douglas (2010) found when educators implemented strategies according to the requirements of students with ABIwith the assistance of an integration aide, students were more successful in their return to school despite challenges with academic achievement. Similarly, students were more accepting of receiving support in this circumstance (Mealings & Douglas, 2010).

There is an age-related discrepancy in the literature with respect to the relationship that exists between injury severity and number of friendships. Recent research has demonstrated a positive relationship can exist between injury severity and life satisfaction in individuals between the ages of 9 and 81 (mean age of 45 years old;Jones et al., 2011). In such cases; the greater the injury severity, the better life was perceived. This satisfaction was attributed to redefining and discovering one's self-identity based on new friendships, social supports, and services in addition to the perceived inner strengthfrom surviving such catastrophes that contributed to overall well-being and belonging.

Other research, particularly in the case of children and youth, has found that it is typical for students and parents of children with TBI to report having fewer friends and a lessened sense of belonging(Linden & Boylan, 2010; Prigatano & Gray, 2007). In the early stages of recovery, peers who were accepting and welcoming were anchors in maintaining meaningful friendships. On the other hand, students who had trouble with social relationships in school (both teacher and peer) demonstrated poor coping associated with change, dissatisfaction with self, and associated hopelessness with feeling unable to excel in school. Students without successful peer relationships sought out alternative programs and experienced difficulty vocationally. Overall, students' peer and academic support teams have shown to be influential components in identifying, evaluating, and being supportive during change (Mealings & Douglas, 2010).

Age of reintegration postinjury may play a role in the nature of peer support students receive when returning to school. Emotional knowledge and hierarchical cognitive reasoning abilities develop throughout childhood and advance with experience. As such, older students may be more supportive and accepting of the student with ABI and behave less destructively,reducing the harm tohis or her sense of belonging. Earlier research(Crothers, Linden, & Kennedy, 2007) evaluated 100 students in both primary and secondary schools invited to participate in a project (8–9 and 12–13 years of age respectively). Students watched vignettes created about a boy with a brain injury and were administered a Friendship Activity Scale (FAS) to measure the intention of befriending a peer based on the situations. Results demonstrated that gender and age were influential in developing friendships, such that females are more apt than males to become friends with a peer with ABI. Age also influenced the intent of developing

friendships, such that older males were more willing to befriend a peer than were younger ones. This suggests that younger children may have negative attitudes towards children who behave differently and choose not to affiliate with those students. Older students, on the other hand, may have more empathy for individuals in their classrooms(Crothers et al., 2007).

Similarly, other research has found that quality of social support influenced overall subjective feelings of health and belonging. Individuals with TBI (15–61 years of age) reported feeling satisfaction with physical health butidentified lower satisfaction ratings psychosocially for life in general and vocation(Stålnacke, 2007). Not surprisingly, he found that as depression increases, life satisfaction decreases. Significant correlations were also found between social support and life satisfaction as well as social support and community integration. Thus, individuals who have greater social support networks when reintegrating to their community environments, have fewer comorbid psychological presentations, such as depression, and experience greater life satisfaction.

Reintegration Challenges

Structure in the sense of routine, environmental expectations, planning, and organization are essential in remediation for students with ABI. Educators play a large role in accommodating school adjustments in conjunction with parental support. In order to do so, it is imperative that communication and knowledgebase about the injury and its effects and presentations throughout development are communicated and that both parties are knowledgeable about TBI (DePompei&Bedell, 2008). Involvement between parents and teachers is important to improve outcomes for reintegrating students, as it strengthens academic monitoring and support, increasing student sense of support, enjoyment, and

preparedness and motivation to excel. Support from a variety of social networks including parental, peer, and teacher is related to goal mastery, social skills, and academic success. Teacher support is linked to subjective wellbeing and socioemotional wellness in all students. Listening and being appropriately responsive, showing fair-mindedness, encouraging questions, and creating individual opportunities for learning all facilitate autonomy and are well regarded by students (Suldo et al., 2009).

Supporters and advocates for the reintegrating student(e.g., families and educators) also oftenrequire additional support and guidance, oftentimes unfamiliar with terminology andeffects of injury and may experience challenges adjusting to change and expectation themselves (Roscigno & Swanson, 2011).The fact that ABI is not a recognized designation in parts of Canada may contribute to the lack of knowledge base and inability of educators to respond effectively. When provided with learning opportunities to acknowledge, address, and implement remedial strategies for cognitive, behavioural, and psychosocial needs of the student, students with ABI perform better academically and socially(Dise-Lewis, Lewis, & Reichardt, 2009).Children do not participate in approaches often used by adults such as cognitive retraining (Ylvisaker et al., 2005),and therefore the remedial care inadvertently is placed on educators, who not only may not know how to implement strategies for effective learning but also may not realize in most cases that they will be responsible for teaching a student with ABI. Without intervention, the progression of challenges worsen and become harder to cope with in later adulthood when compared to those injured in later adulthood who have mastered those skills (Catroppa et al., 2009; Crothers et al., 2007).

To recapitulate, teacher evaluation of academic performance can affect both academic and socioemotional aspects of life in and outside of the classroom. Long-term deficits in cognitive abilities associated with executive function such as problem solving, attention, memory, information processing speed, visuospatial processing, and language are distinctly evident in individuals with TBI and are salient for functional capacity and environmental adaptability later in life. Intellectual function, social support, and SES preinjury are predictors of academic and psychosocial competence postinjury, in addition to other injury variables including size and structural location of injury. Psychiatric comorbidity and emotional disturbances also often accompany TBI and affect long-term outcomes. Both may be associated with a variety of factors including neurochemical imbalance, sense of self-inabilities, and lack of social skills which precipitate inward feelings such as loneliness and isolation (Al□Yagon & Margalit, 2006; Dikmen et al., 2009) that may influence the students' sense of belonging and future satisfaction with quality of life. Overall, teachers are underprepared to address these concerns, and it is problematic because it can influence their evaluation of student competence,thus having long-term repercussions. Educators should be well informed and prepared to be good judges of performance to prevent, assist with, and recognize learning difficulties so that the student with (or without) ABI is successful in managing environmental expectations academically, psychosocially, socioemotionally, and vocationally later in life.

CHAPTER THREE: METHODOLOGY AND PROCEDURES

This chapter will review the rationale for the research as well as methodology including methods and design, participants, instruments of choice, procedures, data collection, recording, process, and analysis, as well as assumptions. This chapter will also review limitations, credibility, and ethical considerations.

Rationale for Methodology

The methodology for this research was established as part of a larger research project,*School Reintegration for Children and Youth with ABI Research Project* (Good et al., 2012),designed to identify the variables associated with the student (e.g., pre- and postinjury status, injury severity, academic status), parent (SES, support), teacher (e.g., knowledge, awareness, and attitudes towards ABI), and educational-related (e.g., school policy and procedure) variables responsible for successful reintegration (i.e., academically, socially, emotionally, behaviourally) for children and youth with acquired brain injury, and this was the first of its kind.

This research will extract, analyze, and make inferences from the data set of the aforementioned project. More specifically, it will compare reading, writing, language, social competence, and social satisfactionscores of students with ABI based on student performance measures relative to teacher perception of success or achievement in those domains. Since this research is extracting subsets of data, all methodology herein will not differ from that of the existing design, with the exception that the number of participants included for the purposes of this thesis will be based on the current data set. The variables and themes of the current research have a different emphasis than the

largerproject;however, its findings will contribute to the overall discoveries and implications for children returning to school.

Research Methodology and Design

Students enrolled in schools across Ontario, their parent(s)/guardian(s), teacherswho have worked with the students recently, and school principals were invited to participate in the research. For the purpose of this research the parent and principal data will not be examined. This correlationalresearch will compare the quantitative and qualitativeresults of standardized and nonstandardizedmeasures of performance across the domains of reading, writing, and social adaptability for students with ABI to those of their teachers' objective survey and report card ratings. Educators' knowledge and awareness of ABI will also be examined.

This research is designed to obtain a sample geographically and regionally representative of the population of students, families, teachers, and schools across Ontario. Therefore, based on a power analysis of the population density in the province (obtained from Statistics Canada, DMTI Spatial population density for Ontario, 2002) a total of 185 students were selected across western (n=30), central (n =80), south central (n =40), eastern (n =20), and northern (n =5) Ontario. Participants who had sustained a moderate to severe ABIwere 2–5 years post injury, 6–18 years of age and had returned to the regular school system (e.g., not home-schooled) were invited to participate and contribute to this research by a health care practitioner or service providerfrom whom they have receive(d) treatment. These inclusionary criteria are set to include a representative distribution of students across all grades and levels of elementary and secondary education, time to allow for neural recovery (which may otherwise

beconfounding with respect to recovery of function), and to facilitate triangulation of information as there are several raters of competencies (student self-report, parental report, teacher report, and researcher qualitative observation). For the purposes of the current research, a subset of 26individuals will be examined based on available data sets, and not provincially representative per se.

Students

Students from Ontario, Canada between the ages of 8and 18 years participated in this research. Students were invited to participate in this research by a treating health care professional affiliated with the larger research project (Good et al., 2012). Students were, on average, 13 years old (mean age = 12.97, standard deviation=2.97),experienced a moderate to severe ABI, were on average 6 years postinjury, and had returned to the classroom environment. In terms of geographic representation, 34.6% of students (n = 9) were from central Ontario, 30.8% (n = 9) from south central Ontario, 26.9% (n = 7) from western Ontario, 7.7% (n = 2) from eastern Ontario. Due to unavailable educator data, representation from northern Ontario is not available for the purposes of analysis. Students were in grades 2 through 12, with minimum variability observed between grades (M = 6.88, SD = 2.96). Since the data collected from this research were part of a larger research project (Good et al., 2012), the subset of students selected for this study was based on teacher data available for analysis. A larger pool of students were available for selection;however, corresponding educator data were unavailable for a variety of reasons (i.e., incomplete questionnaires, low participation, school board approval not received, etc.).

Educators

Classroom teachers were identified and paired with their respective students for analysis in this thesis. Twenty-six teachers were used for the current research and varied from 2 to 35 years of teaching experience, with an average of 15 years experience. Educators were distributed across the province in accordance with the student representation. Educator and student data will be discussed in greater detail in Chapter Four.

Hypotheses

The hypotheses for this researchwere twofoldand based on the likelihood, or not, of a discrepancy existing between educators' subjective ratings of student academic performance and social competence and objective measures of student ability. Any discrepancies/nondiscrepancies between educators' evaluations and student competencies were investigated as a function of educator knowledge about ABI in relation to whether the student was identified with learning challenges as evidenced by an Individual Education Plan (IEP) and sense of inclusion in the classroom. The hypotheses based on this rationale were as follows:

Hypothesis 1:A discrepancy will exist between teachers' subjective ratings of their students' academic performance and students' standardized assessment of academic performance.

***Hypothesis* 2**: A discrepancy will exist between teachers' subjective ratings of their students' social competence and students' self-report of social stress and adaptability, friendships, and emotional and personal adjustment with friends and at school.

Hypothesis 3: Students with teachers who are knowledgeable about ABI are expected to perform better academically and sociallywhen compared to students in classrooms with teachers who are uninformed of the effects ABI has on learning. It is expected that the latter group will be disadvantaged with respect to academic achievement and social inclusion as a function of ABI knowledge.

Instrumentation

Students and teachers participated in completing a variety of instruments as discussed below.

Students

Students participated in all components of theWechsler Individual Achievement Test,2nd edition (WIAT-II, 2005; note: the 3rd edition of the WIAT was not published at the time of the larger project's research proposal).The WIAT-II is a standardized measure assessing reading, comprehension, writing, and arithmetic. Due to individual differences as a function of injury (site, length of recovery), and based on the notion that educators rate students relative to the grade-based curriculum expectations; scores on the WIAT-II were derived fromgrade-based norms. The Behaviour Assessment System for Children, 2nd edition (BASC-2)was completed by both students and teachers in order to provide information on the students' socioemotional competence. Content scales included executive function, developmental social disorders, emotional self-control, as well as indices of depression and anxiety. In addition tothese standardized questionnaires, nonstandardized but widely used questionnaires were alsoused and for the purposes of this research, included the Multidimensional Students' Life Scale (MSLSS). The MSLSS is a 40-item scale that measures student life satisfaction and includes eight items relating

to friend and school relationships.In addition, educators were asked to report whether their participating student was identified in the classroom as requiring support as evidenced by an IEP.

Educators

Educator evaluations of student performance and competence in academic and social domains were obtained through report cards and individual education plans (IEPs) found in the students' Ontario School Records of performance (OSR) in addition to their ratings as obtained from the School Function Assessment (SFA), Instructional and Behavioural Management Survey (IBMAS; a scale that assesses which instructional and behavioural approaches are used in the classroom). Educator knowledge and awareness of ABI based on the responses of the Knowledge of Special Needs Survey (KNSQ) were also evaluated.

Procedures

Hospital/institution, school board, and university research ethics approval was obtained prior to conducting research. Health care providers from Ontario children's treatment hospitals and outreach programs (e.g., Ontario Brain Injury Association) affiliated with this research project invitedfamilies receiving care for theirchildren who had sustained a moderate to severe ABI to participate in this research project. Families that qualified for participation and demonstrated interest in the project were provided with more information by a Research Assistant at Brock University andscheduled for testing afterinformed consent was received. The participant's medical and scholastic information pre- and postinjury was obtained from the treatment hospitals, families, and schools respectively. Testing Research Assistants (TRA) (including this author)

travelledto the homes, schools, and/or agreed upon locations for testing administration and data collection. At that time, the student and his or her participating family member provided consent for the researcher to contact the student'sschool and invite the student'steacher and school principal to participate in the project. A scripted call to the school inviting the identified faculty was then placed to invite further participation. The TRA provided assistance, acted as a resource for questions, and facilitated participation for students, families, and teachers. Upon data collection, all responses were alphanumerically coded to preserve anonymity and entered into electronic data analysis software (Microsoft Excel 2011 and SPSS version 20) for further interpretation. Participating schools and families were compensated for their participation. Triangulation was achieved via receiving quantitative and qualitative data from students (medical and OSR files and included instruments), teachers, and research assistant observations combined with scores attained on standardized measures. All participants were debriefed at the end of their participation.

Data Collection and Recording

Data collection for this research was twofold. Standardized measures and respective data gathering were completed by the TRA with the student during their initial visit. At this time nonstandardized measures were administered to the participating parent/guardian to complete, as the TRA was available if assistance or clarification was required. Upon test completion, students were provided with a series of brief questionnaires (refer to Appendix B) to complete at their leisure with a return postage-paid mailing envelope. Teachers and principals were informed of the research and its relevance to the classroom setting by the TRA during a brief meeting scheduled to inform

and invite their participation. Educatorswere provided with respective questionnaire booklets (refer to Appendices C and D) for relevant questionnaires) and postage-paid return mailing envelops to send at their convenience. Studentand teacher testing took an estimated 180, 30, and 80minutes respectively to complete. All test training was conducted for the TRAs using an instruction manual adapted specifically for the subtests that pertained to this project. Formal test trainingensured consistency in data administration and recording, as well as developed a knowledgebase surrounding ABI, and the implications of this research.

Data Processing and Analysis

All data were collected and returned to Brock University for data scoring, entry, and analysis. Data were scored according to standardized administration and scoring guidelines. Data were scored and entered to Microsoft Excel and Statistical Packages for the Social Sciences (SPSS, version 20) for statistical analysis. Data scoring workshops were conducted to ensure consistency among data research assistants. Bivariate correlational analysis, mixed model analysis of variance (ANOVA), and descriptive analyses (e.g., frequency, means, percentages, etc.) were conducted.

Criteria for Evaluation

Bivariate correlation analysis and Mixed Model Univariate Analysis of Variance (ANOVA) were used for data analysis.

Correlation Analysis

Students' performance scores on the WIAT-II across the domains of math, writing, and oral comprehension were compared to teachers' evaluation of student performance as indicated by their OSR records and ratings on the SFA.

Educators' ratings of their students' social competency were evaluated by the BASC-2 adaptability scales and social competence subscales on the SFA and BASC-2. All scores were later compared to students' self-reports of social stress and adaptability (OSRs, SFA, BASC-2, MSLSS). Social inclusion at school and with friends was determined for students with ABI based on "friend" and "school"subscales of the MSLSS. Students' socioemotional status was examined with respect to self-report on emotional symptoms and personal adjustment as well as behavioural symptoms (BASC-2). Demographic information such as age at the time of injury was used as descriptive data that could facilitate an explanation of the findings related to academic and social competencies. The use of classroom instructional approach by teachers was also considered.

Mixed Model Univariate Analysis of Variance (ANOVA)

Whether a discrepancy existedas a function of teacher knowledge of ABI (KNSQ)wasexamined. To observewhether or not teacher knowledge of ABI related to the outcome measures, educator responses to the KNSQ that specifically addressedwhether educators were knowledgeable on ABI wereexamined via repeated measures AVOVA, in concert with whether the student was provided additional academic support (IEP or no IEP). In order to observe the individual contribution of related measures on the same construct (either academic or social), there were 3 independent variables for each analysis (knowledge: high ABI knowledge, low ABI knowledge; IEP status: IEP, no IEP: and,a third factorassociated withacademic, or social,domain). The dependent measure inall ANOVA's conducted was thecompetency performance score (either percentile rankings, or average rating) obtained in the respective domain.

Methodological Assumptions

All precautions weretaken to ensure the successful execution of this research. All test responses werescored and checked for accuracy; testing materials and questionnaires were returned to Brock University completed and in a timely fashion (within a year) to permit analysis. Research Ethics Board clearance was received (Appendix A) from involved universities, treatment centres, and participating school boards.

Limitations

The limitations of the current research included sample size, largely as a function of difficulties associated with data collection. Outdated family contact information, reduced participation interest, limited permitted access to teachers,and attritionlimitedthe amount ofcollected data.A larger sample size would improve the power for analyses; and while the sample had well distributed representation of students across age groups, grades and geographical regions, small samples limit the generalizability of the results. Furthermore, due to the evaluative nature of the questionnaires, integrity of responses may be questionable. The WIAT-III, while not available to be used in this study, may have been a preferred assessment of academic capacity (over the WIAT-II) asthere is a literature indicating its items match more closely the current academic curriculum (Burns, 2010).

Establishing Credibility

All tests involved in this research project were conducted under the supervision of an extensive research team comprised of:clinical health care professionals (clinical neuropsychologist, developmental pediatrician, occupational therapist, paediatric physiatrist) and nonclinical research and academic professionals (education,preserviceand

professional training, research, and specialization with children, youth, and the school system—particularly who have sustained ABI). All tests used in this research are statistically reliable and valid. The Behavioral Assessment Scale for Children, 2nd Edition (BASC-2; Reynolds &Kamphaus, 2004)hasstudent test-retest reliability ratingsfrom .84 to .97, and teacher test-retest reliability ratingsfor composite scores from .80 to .90. The Multidimensional Students' Life Satisfaction Scale(MSLSS; Huebner, 2001) contains alphas for its various domains ranging from .70 to low 90s, test–retest reliabilities for 2 to 4 weeks fall in .70 to .80 range, convergent and discriminant validity, normative data are available (Huebner, 2001). The WIAT-II subscale ratings are as follows: reading reliability -.97; mathematics -.95; written -.94. School Function Assessment (SFA) (Coster, Deeney, Haltiwanger, & Haley, 1998) has "exceptional internal consistency and test-retest reliability,"with evidence of construct validity (Coster et al., 1998, p 224.).

Ethical Considerations

Confidentiality, privacy, and safety of participants and their informationwere a primary ethical consideration for this research. Research and ethics clearance was obtained prior to conducting research from treatment hospitals, schools, and participating institutions. All TRAswererequired to complete a vulnerable sector police clearance prior to meeting with families, or entering schools. All participation was voluntary, and data werealphanumerically coded upon receipt to preserve anonymity. Teachers and principals were not required to participate, and their choice to do so, or not, was not conveyed to participating students or families. All medical and school record information/facsimile that was transmitted electronically or submitted via fax was done securely with encrypted password-protected documents and on secured lines. All paper copies of data

weresimilarly coded, removing any identity of the participant, and kept locked and secured in a Brock University Research Office and will be destroyed after 10 years following study completion. Participants were not expected to be compromised as a function of this research, although they could feel personally evaluated due to the nature of survey questions. As a result, all attempts were made to reassure both students and teachers of their anonymity (e.g., no school would be identified, no individual data reported in the research, etc.).

Restatement of the Area of Study

Twenty-six students 6 to 18 years of age, 1 to 12 years postinjury, who have reintegrated with their school community after sustaining a moderate to severe ABIwere examined on academicand social competence and complacency through the administration (student, teacher) of standardized and nonstandardized measures of performance. Students' objective performances were compared to teacher ratings of perceived academic and social ability to determine whether a discrepancy existed as a function of knowledge about brain injury.

CHAPTER FOUR: PRESENTATION OF RESULTS

The purpose of this research was to examine whether educator subjective ratings of student abilitywererelated to or predicted bystudents' performance on standardized measures of academic and social domains on subscales of reading, writing, oral communication,as well associal competency. Students' participation in standardized testing allows their performance to be compared to age- and grade-related norms. Discrepancies between educator evaluation and student performance were expected to be related toteacher knowledge of ABI. Similarly, students' attitudes towards school/teachers were also evaluated as a function of ABI knowledge and awareness. Both qualitative and quantitative data wereexamined. Therefore, in addition to descriptive statistics,inferential statistics wereconducted and included bivariate correlation analysisand mixed model ANOVAs. This chapter will further elaborate on the findings from the current research.

Participant Demographics

For the purposes of this research, the data from 26 students and their respective educators was collected and analyzed. Participant demographic information is outlined below.

Students

The data from 26 students were used for this research.Students were approximately13 years of age (M =*12.97, SD* = 2.97; ranged from 8.27 years to 18.09 years). Males represented 53.8% of the sample (N = 14; females N = 12, 46.2%).Eleven students (42.4%)attended elementary school, and15 (57.6%) attended secondary school. The regional representation of the students was greatest in central and southwestern

Ontario (see Figure 1). Students were approximately 6 years postinjury (*M* = 6.07, *SD* = 3.35) and sustained neural trauma in a variety of brain areas. Frontal (46.2%), tempo-parietal (11.5%), and occipital (7.7%) regions as well as the cerebellum (7.7%) and brain stem (19.2%) were the most commonly reported to be injured. Information was not available for two individuals (7.7%; see Table 1). Glasgow ComaScale (GCS; Teasdale &Jennett, 1974) scores were not available for all participants; however, of the 15 participants for whom this information was obtained,7% were mild, 40% moderate, and 53% were severe. Causes ofneural trauma included involvement in motor vehicle collisions (15.5%; *n* = 4), sports-related injuries (19.2%; *n* = 5), falls (7.7%; *n*= 2), tumors (15.5%; *n* = 4), encephalitis (3.8%, *n* = 1), brain cancer (3.8%, *n* = 1), stroke (3.8%, *n* = 1), anoxia (3.8%, *n* = 1), and bacterial meningitis (7.7 %; *n* = 2); 5 (19.2%) had unknown or unreported etiologies.

Fifty-six percent (*n* = 14) of students' neural traumas were traumatic in nature, while 40% (*n* = 10) were classified as nontraumatic ABI. Classification of the remaining 2 (4%) participantswere unknown. Of those with completed medical documentation, the reported average loss of consciousness (LOC) for the traumatic group (*n* = 13) was 29.54 hours (*SD* = 43.65), whereas the nontraumatic ABI group (*n* = 8) experienced LOC for approximately 8 days (*M* = 8.12, *SD* = 14.53). Posttraumatic amnesia (PTA; i.e., memory loss) was experienced in 16 students. PTA occurred for approximately 17 hours in traumatic cases (*M* = 17.36, *SD* = 28.42). Seventy-eight percent of the reported traumatic cases (*n* = 9) sustained PTA for 24 hours or less, while 22% (*n*=2) sustained PTA of 60 hours or greater. The nontraumatic group (*n* = 7) sustained PTA of an average6days (*M* = 6.14, *SD* = 14.34), 71.4% of participants reported PTA for 12 hours or less, while

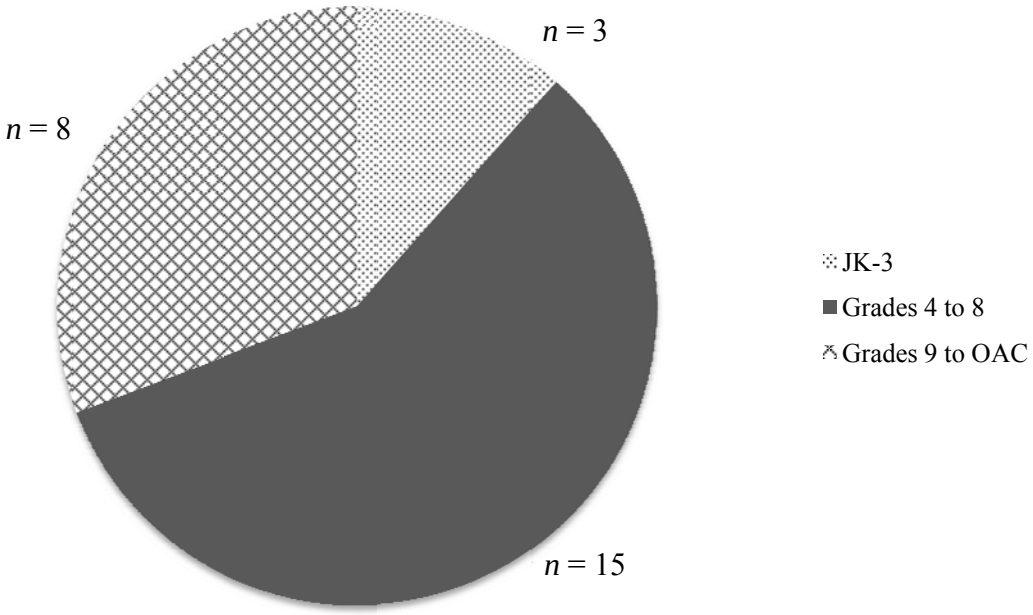

Figure 1. Distribution of grades taught.

Table 1

Site and Extent of Reported Injury (N = 26).

Site of the injury	Frequency	Percent
Frontal	12	46.20
Occipital	2	7.70
Brain stem	5	19.20
Temporal & parietal	3	11.50
Cerebellum	2	7.70
Missing data	2	7.70

Extent of Injury	Frequency	Percent
Bilateral	5	19.20
Lateralized right	7	26.90
Lateralized left	3	11.50
Diffuse	7	26.90
Subcortical	2	7.70
Missing	2	7.70

28.6% of participants experienced PTA for 96 hours or greater.Notably, LOC and PTA results are illustrated in Tables 2 and 3.

Documentation of Individual Education Plans (IEP) was also noted. There was no documentation of an IEP for 34.6% of the students (n = 9), 42.3% of the students were on a modified IEP (n= 11), 19.2% were on an accommodated IEP (n = 5), and 3.9% (n = 1) had both an accommodated and modified plan at their academic setting.The exceptionalities noted in the IEPs were particularly interesting and, with the exception of one student, ABI was not recognized. Notably only two students were identified with IEPs prior to injury. Students who had injuries at age 6 or earlier were more likely to be identified and provided an IEP than students who acquired their injury at a later age (59 % vs. 41%, respectively).

Educators

The current sample is restricted to 26 since several educators have not yet returned their forms, some have declined participation, and/or their corresponding school board has declined approval to conduct this research. The current research investigated the *paired* data of returned student and teacher questionnaires. Of the 26 educator respondents, 69.22% (n = 18) obtained their teaching credentials and certifications in Canada, 7.69% (n = 2) from the United States, 11.54% (n = 3) from other countries, 3.86% (n = 1) did not attend a teacher's college (has a doctorate),and 7.69% (n = 2) were unreported. Overall, the reported mean teaching experience of the 24 educators (2 missing data; 7.69%)was 15 years (M = 15.29, SD = 10.11) with 49% (N = 13) of educators reported teaching in a primary school setting, 26.9% (n = 7) in a secondary school, and 15.4% (n = 4) had experience teaching multiple grades across levels

Table 2

Frequency Table for Length of Unconsciousness Following Injury (N = 26).

Time (hours)	Frequency	Percent
0	9	34.60
1	1	3.80
3	1	3.80
7	1	3.80
13	1	3.80
48	1	3.80
72	2	7.70
96	1	3.80
120	1	3.80
168	1	3.80
336	1	3.80
1,008	1	3.80
Missing data	5	19.20

Table 3

Frequency Table for Loss of Memory Following Injury (N = 25, 1 missing on type of injury).

Traumatic brain injury (*N* = 14)		
Time (hours)	Frequency	Percent
0.00	5	35.70
0.25	1	7.10
24.00	1	7.10
60.00	1	7.10
72.00	1	7.10
Missing Data	5	35.70

Non-Traumatic brain injury (*N* = 11)		
Time (hours)	Frequency	Percent
0.00	4	36.40
12.00	1	9.10
96.00	1	9.10
94.00	1	9.10
Missing Data	4	36.40

Educator participants came from a variety of disciplines and specialties including math, French, drama, music, arts and design, social sciences, science, language, English, history, geography, business; religious studies, machine, and home economics were also included. It is noteworthy to mention that three educators identified special needs/learning resource to be within their area of expertise. When asked to identify the number of students in the classroom with exceptionalities that might affect learning outcomes, 34.6% (*n* = 9) of educators reported that there were no cases of students with TBI in the classroom, while 53.8% (*n* = 14) acknowledged that students in their classroomshave sustained a TBI, and three educators did not answer (11.6%). As indicated by the KNSQ (median split scores), 57.7% (*n*= 15)of educators demonstrated knowledge about ABI and its associated sequelae, and 42.3% (*n*= 11) demonstrated a low to minimal knowledge base for ABI and its effects on learning.

Findings

Hypothesis 1

Bivariate correlations of educators' subjective ratings of their students' academic performance and students' standardized assessment of academic performance did not reveal significant relationships for most domains of academic functionexcept for written work and reading(see Table 4).School Functional Assessment (SFA) and school grades (as indicated in OSRs)as well as the WIAT-IIsubscales on reading, math, writing, and oral communication were measures included in the correlation matrix.

Teachers' ratings of written work were positively correlated with students' capacity on oral language (i.e., functional communication) as well as math and reading (see Table 4). However, teachers ratings (i.e., SFA, OSR report cards) of English and

Table 4

Educator Subjective Ratings of Student Performance Relative to Standardized Scores: Correlation Matrix.

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. OSR average		.83**	.89**	.09	-.02	.41	.26	.39	.60*
2. OSR English average			-.76**	.27	.11	.43	.17	.37	.51*
3. OSR math average				.04	-.03	.46	.27	.31	.65**
4. SFA written work average score					.61**	.32	.14	.49*	.39
5. SFA functional communication average score						.33	.20	.36	.37
6. WIAT-II: reading comp standard score							.84**	.87**	.56**
7. WIAT-II: math comp standard score								.69**	.33
8. WIAT-II: written language comp standard score									.55**
9. WIAT-II: oral language standard score									1.00

- $p < 0.05$. ** $p < 0.01$.

math were not significantly correlated with the standardized measures of these domains (i.e., WIAT grade-based composite scores for reading, math, written and oral language standard scores). Therefore, as hypothesized, a discrepancy was observed between teacher ratings of student competency relative to their neurocognitive capacity in academic domains of functioning. To ensure that educators' subjective ratings of student performance were not constrained by adjusted grading criteria used for students who have been provided an IEP, bivariate correlation analyses were alsoconducted separately for students who were identified (asindicated by IEP) and those who were not, and still no significant correlations were found. This indicates that, independent of identification, educators' ratings of students were similarly/equivalentlydiscrepant across domains of functioning.

Hypothesis 2

Relationships between educators' subjective ratings of their students' social competency and students' self-reported social competencywere examined. Measures extracted from the BASC-2assessments (i.e., social skills, adaptability, school problems, etc.) were compared with students' BASC-2 reports of social stress, sense of inadequacy, and school problemsas well as their ratings of school inclusion (MSLSS). Overall, as hypothesized, there were no significant relationships found between teachers' perceptions of students social competence for both BASC-2 and SFA measures. For example, educators reported their students' to be socially competent (*t*-score < 60; 90+ percentile) while students indicated stress and inadequacy levels to be below the (*t*-score < 50; 50th percentile) respectively. Not surprisingly, the only significant correlations found were those associated with the same respondent (e.g., teachers' ratings of adaptability in the

school setting were positively related to teachers' perception of students' social skills demonstrating within-subject consistency.An exception to this, students' perceptions of their social skills were not significantly related to their perception of their problems at school(refer to Table 5).

Hypothesis 3

It was of interest to examine student competencies as a function of teacher knowledge of brain injury andstudent identification of learning challenges in the classroom (as indicated by the presence of an IEP). Two teacher groups were created based on their responses on the Knowledge of Special Needs Questionnaire (KNSQ)—a group with low knowledge of ABIand a group with high knowledge of ABI (median split); and two student groups were considered (IEP vs. no IEP).

A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 4 (WIAT – II reading, math, written language, oral language) Mixed Model ANOVA was conducted to assess student performance across academic domains of reading, math, writing, as well as oral language as a function of ABI knowledge and identification (IEP). Overall, students tended to perform less well in math. LSD post hoc comparisons indicate that math scores were significantly different from reading (p = .002) and writing (p = .003), but not oral language (p = .134). Importantly, there was a significant main effect of IEP status $F(1, 22) = 4.36$, p = .049, such that students who were on an IEP did not perform as well as those who were not (M = 35.27, SD = 6.84; M = 59.38, SD = 9.31, respectively).There was also a significant interaction of ABI knowledge by competence area, $F(1, 22) = 7.19$,

Table 5

Measures of Social Competency: t-Score Correlation Matrix

		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1.	MSLSS Q. 18 I like being in school		.41	.15	.76**	-.06	-.37	-.03	-.22	.50*	-.46	-.35	-.32
2.	MSLSS Q. 20 I wish I didn't have to go to school			.12	.60**	-.10	-.26	.10	< -.01	.21	-.18	-.34	.13
3.	MSLSS Q. 24 I feel bad at school				.05	.10	-.26	-.04	-.13	-.07	.03	-.03	-.18
4.	MSLSS Q. 17 I look forward to going to school					-.01	.24	.03	.13	.42	-.35	-.35	.20
5.	BASC-2 student school Problems *t*-score						.20	.44*	.55**	-.19	.29	.23	-.26
6.	BASC-2 student attitude towards school *t*-score							.01	.05	-.25	.06	.22	-.36
7.	BASC-2 student social Stress *t*-score								.62**	-.18	.40	.49*	-.52*
8.	BASC-2 student sense of inadequacy *t*-score									.30	.26	.38	-.40
9.	BASC-2 teacher social skills *t*-score										-.54**	-.64**	.41*
10.	BASC-2 teacher Withdrawal *t*-score											.60**	-.41*
11.	BASC-2 teacher School Problems *t*-score												-.41*
12.	BASC-2 teacher adaptability *t*-score												1.00

$p < 0.05$. ** $p < 0.01$.

p = .01, such that students were disadvantaged if their teacher had limited knowledge of ABI. This was particularly the case for students on an IEP (M = 38.36, SD = 7.59; M = 56.29, SD = 8.69, respectively). Refer to Table 6 and Figure 2.

A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 2 (Inclusion: BASC-2 social stress, BASC-2 sense of inadequacy) Mixed Model ANOVA was conducted to assess sense of inclusion based on student reports of social stress and sense of inadequacy as a function of ABI knowledge and identification (IEP). The main effect of identification was not significant,F(1, 20) = 2.96,p = .101 (see Table 7); however the patternillustrates that social stress is more pronounced for students who have an IEP/identification (M = 34.71,SD = 5.12; M = 22.2, SD = 6.64). Although a two-way interaction was not evident, F(1, 20) = 2.36, p = .139,a pattern demonstrates that students who are provided additional support (on an IEP) in a classroom with a teacher who reports low ABI knowledgetend to experience more social stress and sense of inadequacy than students who are not an IEP (see Table 7 and Figure 3). Alternatively, the pattern indicates that independent of IEP, students paired with a teacher knowledgeable about ABI experience less social stress and sense of inadequacy. Sense of inadequacy isgreater than reported social stress independent of ABI knowledge, and student reports continue to fall below the mean respectively when compared to age- and grade-related peers (M = 47.35, SD = 5.66; M = 28.45, SD =4.19).

A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 2 (social adjustment: BASC-2 social stress, BASC-2 locus of control) Mixed Model ANOVA was conducted to assess sense of adjustment based on student reports of social stress and

Table 6

Analysis of Variance for Academic Competency as a Function of IEP and ABI Knowledge

Source	*df*	*F*	*p*
Within subject			
WIAT-II Performance (Reading, math, writing, and oral communication)	1	14.80	.001*
WIAT-II Performance x ABI Knowledge (high vs. low)	1	7.19	.014
WIAT-II Performance x ABI Knowledge x IEP (or no IEP)	1	0.13	0.727
Error	22		
Between subject			
ABI Knowledge (high vs. low)	1	2.4	.135
IEP (or no IEP)	1	4.3	0.49*
ABI Knowledge x IEP (or no IEP)	1	.31	.583
Error	22		

Note. Greenhouse-Geisser correction used

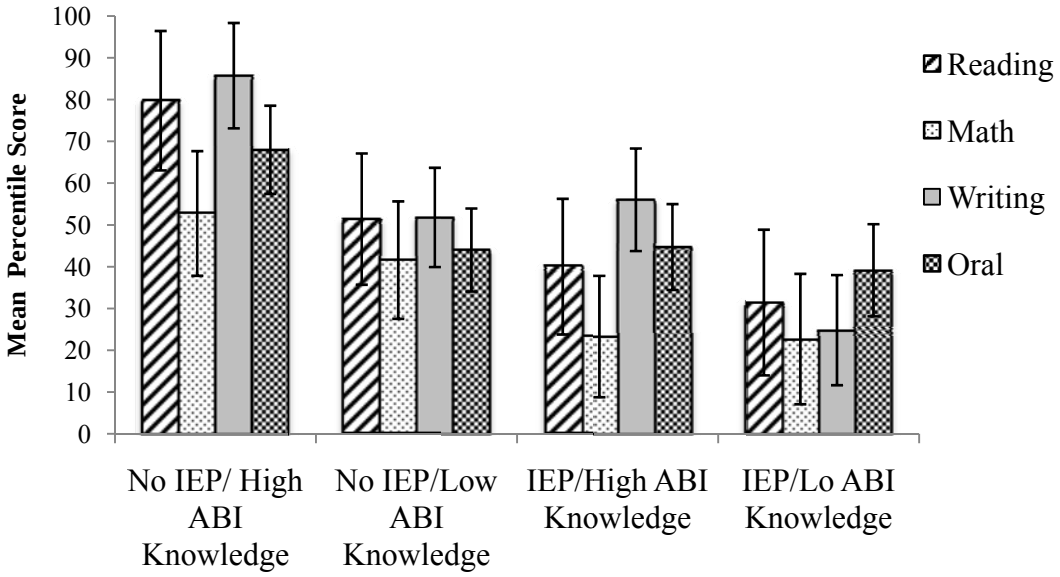

Figure 2. WIAT-II Performance of academic competency as a function of ABI knowledgeand identification.

Table 7

Analysis of Variance for Social Stress as a Function of IEP and ABI Knowledge.

Source	*df*	*F*	*p*
Within subject			
SSSI (social stress and sense of inadequacy)	1	15.13	.001*
SSSI x ABI Knowledge (high vs. low)	1	0.57	.460
SSSI x IEP (or no IEP)	1	0.26	.617
SSSI x IEP (or no IEP) x ABI Knowledge (high vs. low)	1	0.34	.566
Error	20		
Between subject			
ABI Knowledge (high vs. low)	1	1.06	.315
IEP or no IEP	1	2.96	.101
IEP (or no IEP) x ABI Knowledge (high vs. low)	1	2.37	.139
Error	20		

*Note.*Greenhouse-Geisser correction used.

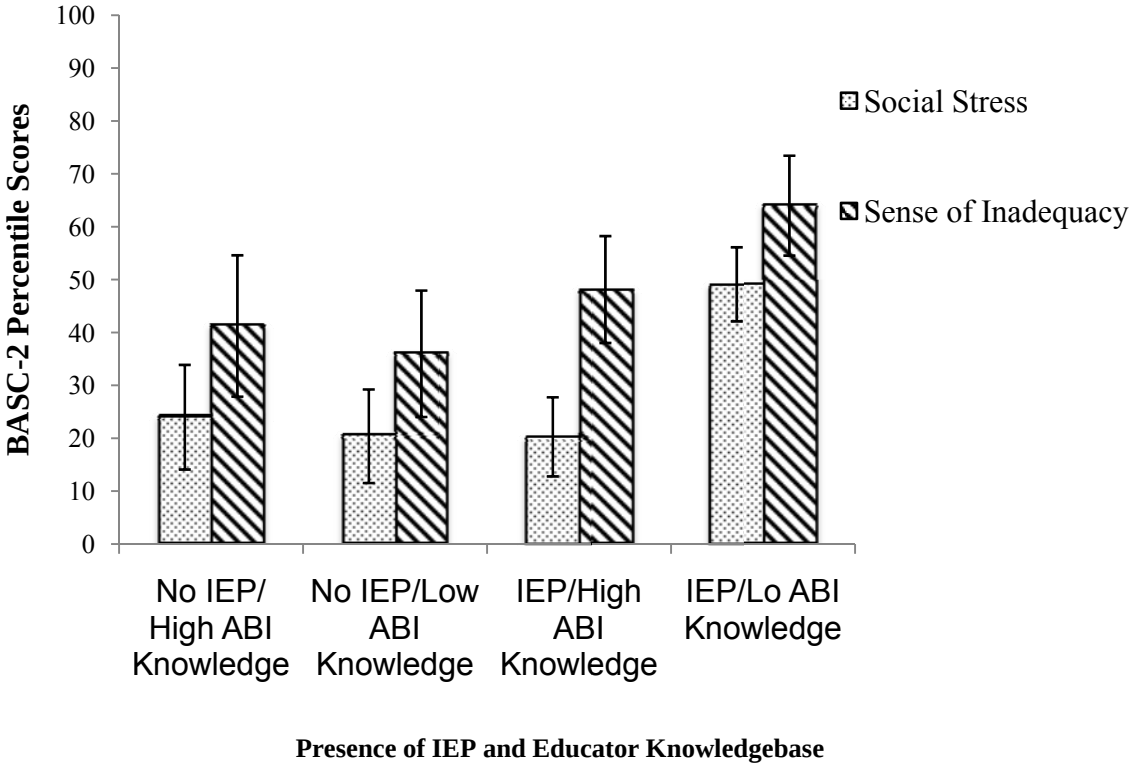

*Figure 3.*Self-reported ratings social stress as a function of ABI knowledge and identification.

degree to which students report feeling control of the events (academic and social) in their environment as a function of ABI knowledge and identification (IEP). A significant main effect of teacher knowledge F (1, 20) = 6.22, p = .030) indicates that students are more socially adjusted if the educator is knowledgeable about ABI (M = 23.88, SD = 5.61; M = 42.79, SD = 5.10, respectively). Further, a two-way interaction is evident, albeit as a trend F(1, 20) = 3.01, p = .098), such that students who have an IEP and are taught by a teacher with low ABI knowledge experience greater social adjustment issues (entering the clinical at risk range)when compared to students with an IEPtaught by teachers who are knowledgeable about ABI (social stress: M = 49.13, SD = 6.99; M = 20.29, SD = 7.48; LOC: M = 59.25, SD = 8.45; M = 31.00, SD = 9.05). Refer to Table 8 and Figure 4.

A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 2 (Inclusion: MSLSS friend average, MSLSS school average) Mixed Model ANOVA was conducted to assess perceptions of friendships (social inclusion) and school environment (school inclusion) as a function of educator knowledge and identification. Statistically significant results were not found (see Table 9, Figure 5), however it is evident as represented by the available data, thatstudents experience more challenges within the context of with schoolthan with friendships F = (1,19) = 14.88, p = .001 (M = 3.24, SD = .21, M = 3.87, SD = .22, respectively). In addition, it appears that students reported more concerns with social stress surrounding peer relationships and inclusion if they were identified with an IEPand were in a classroom with an educator with low knowledge about ABI, as well as, when the teacher was knowledgeable but the student was not identified (Table 9 and Figure 5).

A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 2 (Adjustment: BASC-2 emotional symptoms index and personal adjustment measures) Mixed Model

Table 8

Analysis of Variance for Social Adjustment as a Function of IEP and ABI Knowledge.

Source	*df*	*F*	*p*
Within Subject			
Social Adjustment	1	3.27	.085
Social Adjustment x ABI Knowledge (high vs. low)	1	1.37	.258
Social Adjustment x ABI Knowledge (high vs. low) x IEP (or no IEP)	1	1.48	.237
Error	20		
Between Subject			
ABI Knowledge (high vs. low)	1	6.22	.030*
IEP (or no IEP)	1	3.01	.098
ABI Knowledge (high vs. low) x IEP (or no IEP)	1	1.61	.218
Error	20		

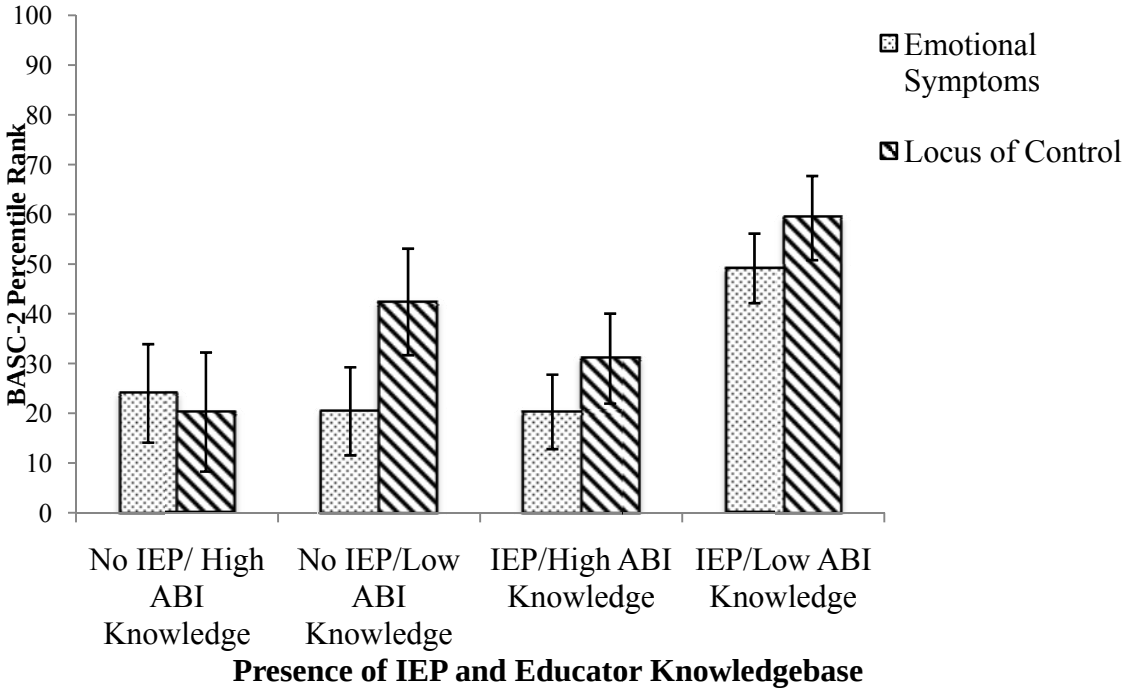

Figure 4. Self-reported ratings of social adjustment as a function of ABI knowledge and identification.

Table 9

Self-Reported Satisfaction with Friends and School as a Function of IEP and ABI Knowledge.

Source	*df*	*F*	*p*
Within subject			
Combined Satisfaction Average	1	14.88	.001*
Combined Satisfaction x ABI Knowledge (high vs. low)	1	1.60	.221
Combined Satisfaction x IEP (IEP vs. no IEP)	1	0.24	.633
Combined Satisfaction x ABI Knowledge (high vs. low) x IEP (or no IEP)	1	0.41	.529
Error	19		
Between subject			
ABI Knowledge (high vs. low)	1	0.05	.827
IEP (IEP vs. no IEP)	1	0.08	.786
ABI Knowledge x IEP	1	2.09	.165
Error	19		

*Note.*Greenhouse-Geisser correction used.

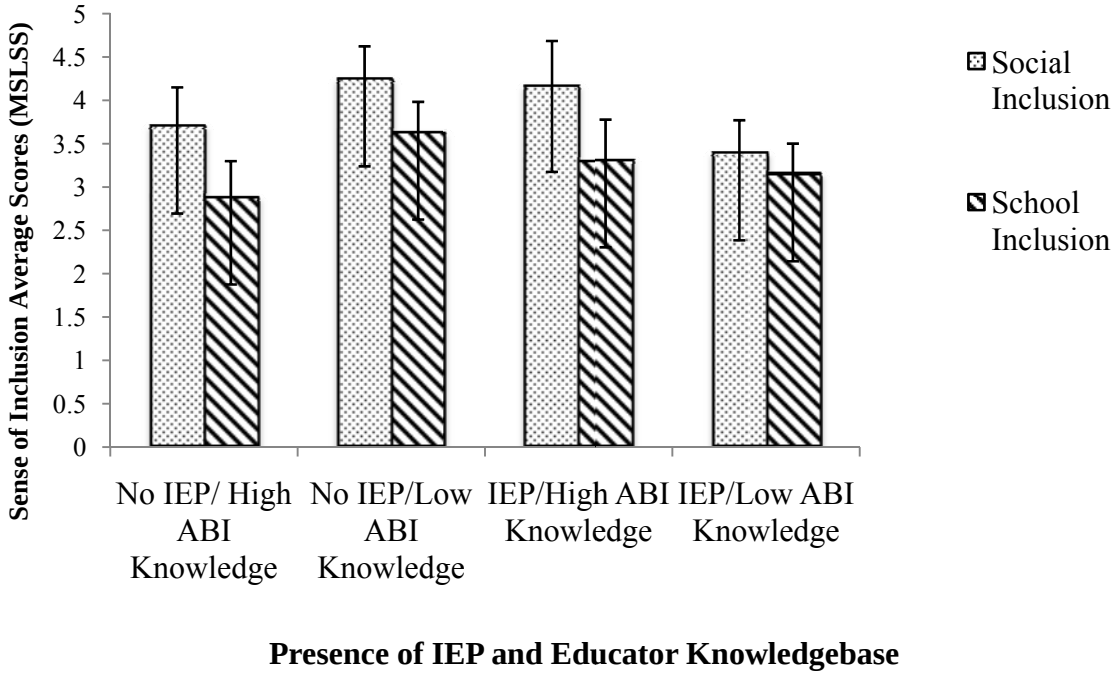

Figure 5. Self-reported ratings of social and school inclusion as a function of ABI knowledge and identification.

ANOVA was conducted to assess student emotional adjustment as a function of ABI knowledge and identification (IEP). As observed in Table 10,a statistically significant main effect wasevident for presence of IEP F (1, 20) = 4.10, p = .05.This indicates that overall students experienced greater difficulties with personal adjustment than emotional symptoms; however, the main effect indicates that emotional adjustment overall is worse for students with an IEP (M = 47.30, SD = 6.09; M = 59. 76, SD = 6.48, respectively) than without (M = 31.65, SD = 7.89, M = 63.60, SD = 8.41).Challenges with personal adjustment were in the clinically significant range and appeared equally as difficultindependent of knowledge or IEP. Personal adjustment may be independent of school environment (see Table 10, Figure 6).

Since student self-perceptions of social and emotional adjustment were in the clinical range, it was of interest to examine educator assessments of externalizing behaviours and perception of school problems. A 2 (Knowledge of ABI: low, high) X 2 (IEP: no IEP, on IEP) X 2 (Teacher Evaluation: BASC-2 externalizing behaviours and school problems) Mixed Model ANOVA was conducted. Repeated tests of between-subject effects show thatteachers with low ABI knowledge had a greater likelihood to report externalizing behaviours and school problemsin students with IEPs (M = 54.50, SD = 7.39; M = 70.10, SD = 8.08, respectively) relative to students without (M = 31.8, SD = 10.41; M = 32.00, SD = 11.43, respectively). Teachers who have ABI knowledge also report more externalizing behaviours and school problems for students with IEPs (M = 44.43, SD = 8.81; 51.57, SD = 9.66) than without (M = 28.5, SD = 16.47;M = 40.00, SD = 18.08). This statistically significant finding$F$ (1, 20) = 4.63, p = .044indicates that the presence of an IEP negatively influences both educator evaluation of challenges as well

Table 10

Emotional Symptoms and Personal Adjustment as a Function of Teacher Knowledge and IEP.

Source	*df*	*F*	*p*
Within subject			
Emotional Factors (symptoms and adjustment)	1	5.05	.036*
Emotional Factors x ABI Knowledge	1	1.40	.251
(high vs. low)			
Emotional Factors x IEP	1	0.97	.336
Emotional Factors x ABI Knowledge x IEP	1	0.18	.680
Error	20		
Between subject			
ABI Knowledge (high vs. low)	1	1.83	.190
IEP (IEP vs. no IEP)	1	4.10	.054*
ABI Knowledge x IEP	1	1.20	.288
Error	20		

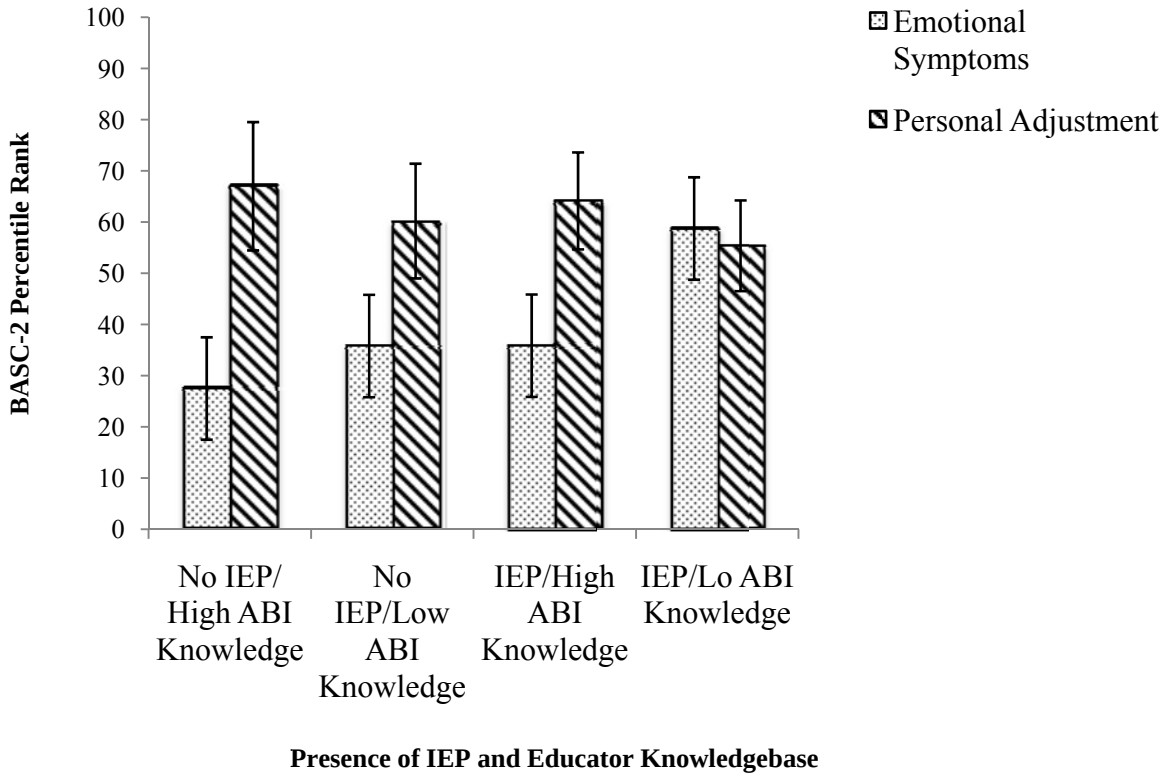

Figure 6. Self-reported ratings of emotional and personal adjustment as a function of ABIknowledge identification.

as student self-perceptions as earlier observed.It is also important to note that the percentiles presented for students with IEPs were at or approaching the clinical range for risk (Table 11 and Figure 7).

An independent samples *t*-test was conducted to determine whether classroom teaching strategies (IBMAS)differed as a function of ABI knowledge (high ABI knowledge: $M = 1.5$, $SD = .26$; low ABI knowledge:$M = 1.4$, SD = .40), and no significant differences were found $t\ (24) = .49$, $p = .631$. Similarly, no significant differences were found when examining whether IEP influenced teaching strategies (IEP: $M = 1.4$, $SD = .36$; no IEP: $M = 1.5$, $SD = .29$) $t\ (26) = -1.09$, $p = .29$). Although teachers did not differ in instructional approach, there was some notable individual variability in approach preference. When qualitatively reviewing the questionsit is evident thateducators with ABI knowledge use strategies that emphasize interactive techniques and observational learning more often (i.e., use hand gestures, modify language, chunking, choral response, rehearsal, etc.; items 3, 5, 10, 12, 23–26) when compared to educators without ABI knowledge (who made more use of daily report cards and using groups for lessons; items 9 and 10; see Figures 8 and 9).

In sum, these quantitative and qualitative findings demonstrate consistent patterns. A discrepancy exists between teacher evaluation of academic performance and student social skills independent of identification. As indicated by the SFA, educators rate their students associally more apt than self-reports on items of social inclusion. Although academic and social competence were not significant as a function of educator knowledge and identification, it is evident studentshad difficulty adjusting postinjury perform better when paired with an informed educator. Finally, no differences in teaching approach were

Table 11

Educator Evaluations of Externalizing Behaviour and School Problems as a Function of ABI Knowledge and IEP.

Source	*df*	*F*	*p*
Within Subject			
Teacher Evaluations	1	2.07	.166
Teacher Evaluation x ABI Knowledge (high vs. low)	1	0.01	.907
Teacher Evaluation x IEP (vs. no IEP)	1	0.21	.650
Teacher Evaluation x ABI Knowledge x IEP	1	0.68	.419
Error	20		
Between Subject			
ABI Knowledge (high vs. low)	1	0.34	.567
IEP (IEP vs. no IEP)	1	4.63	.044*
ABI Knowledge x IEP	1	0.66	.427
Error	20		

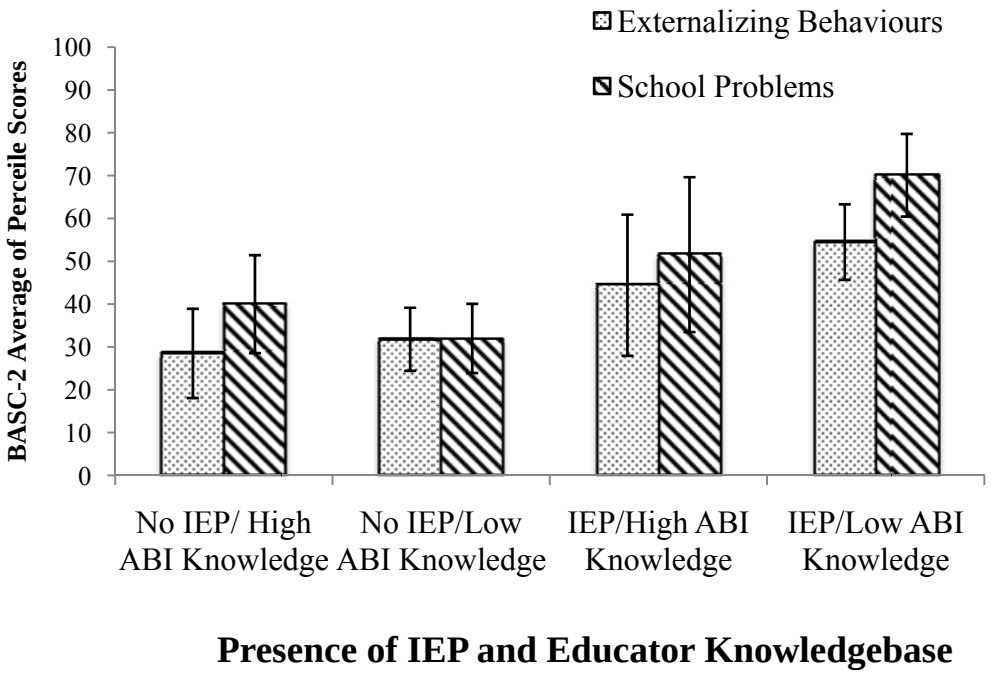

Figure 7. Educator ratings of behavioural status as a function of ABI knowledge and identification.

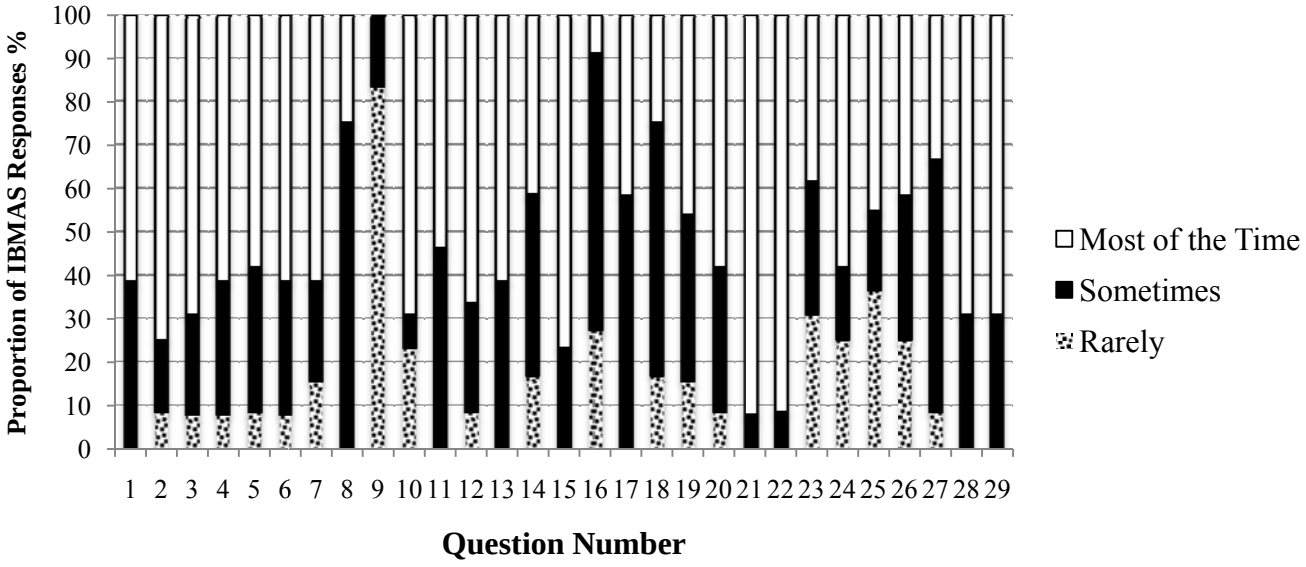

Figure 8. Proportion of responses to classroom instructional approach for teachers with high ABI knowledge.

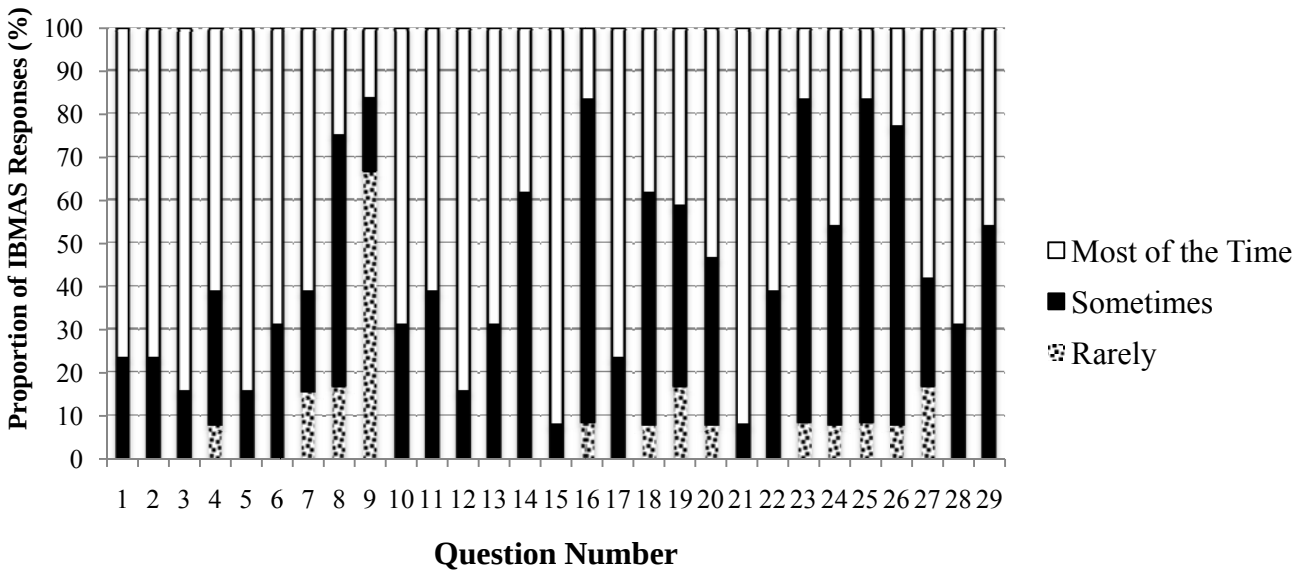

Figure 9. Proportion of responses to classroom instructional approach for teachers with Low ABI Knowledge.

evident independent of IEP; and IEP exceptionality categorizations were variable and for the most part did not include ABI (see Figure 10).

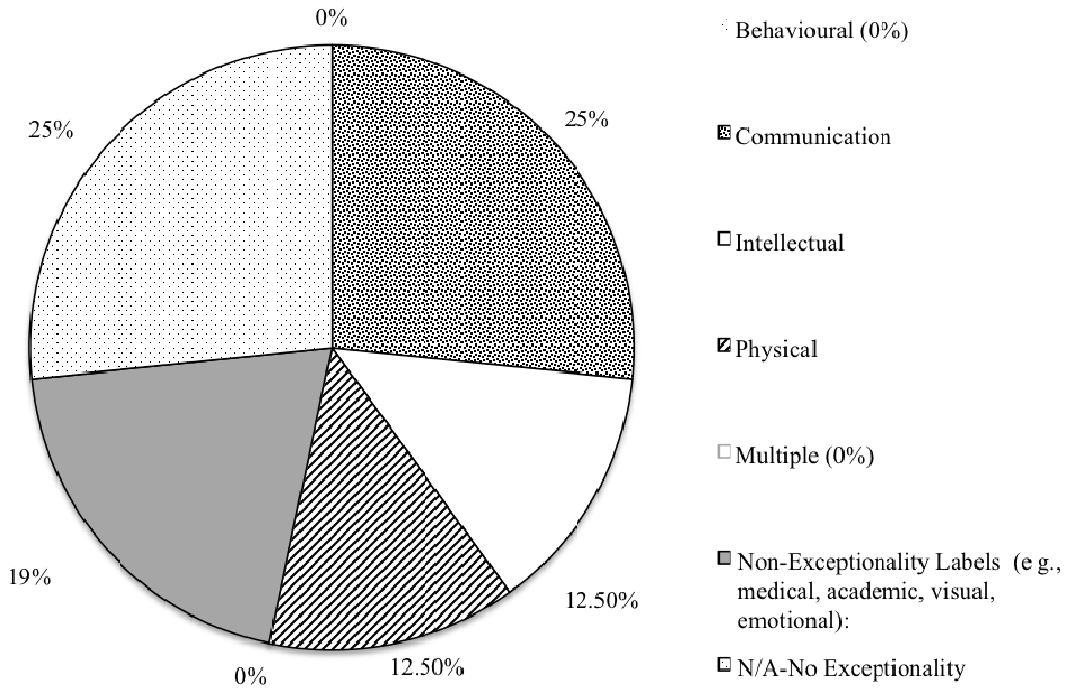

Figure 10. Exceptionalities identified on Individual Education Plans (IEPs).

CHAPTER FIVE: SUMMARY, DISCUSSION, AND CONCLUSIONS

ABI is the leading cause of death and disability for school-aged youth. Due to the internal nature of head injury, associated challenges are often invisible. Students returning to school postinjury are often placed back to their original classroom setting in the similar fashion as if recovering from another physical injury. Since ABI has long lasting effects on neurocognitive, social, emotional, and behavioural functions, students' learning and psychosocial outcomes may be adversely affected, leaving lasting effects in later life. This research explored the influence teacher knowledge of ABI had on students' academic and social outcomes upon returning to school with change in neurocognitive status. Quantitative and qualitative analyses were conducted and will be discussed in the remainder of the document with respect to implications to practice.

Summary of Study

This research set out to examine whether a discrepancy existed between educator subjective ratings of student performance on academic and social measures relative to objective standardized scores of ability. It was hypothesized that if a discrepancy was present, it may be a function of teacher knowledge. Individual education plans for students with ABI were used as a measure of classroom support as well as an additional measure of educator knowledge, as an IEP identifies the students' learning needs and reason for assistance. This research was based on the premise that since ABI is not recognized as an exceptionality in Ontario, students are returning to the regular classroom setting and, based on previous literature, educators are underprepared to accommodate the learning needs of students with ABI (Bullock et al., 2005, Mealings& Douglas, 2010, Mohr & Bullock, 2005, etc.).

When differences between educators' ratings of student performance (i.e., OSRs, SFA) and standardized evaluations of ability in academic domains were compared, it was found that academic performance and student capacity (as indicated by WIAT-II performance) varied as a function of teacher knowledge. Further, nonsignificant correlations suggest that student capacity and evaluations of capacity were dissimilar. It is noteworthy to mention that there were also no significant differences between educator ratings of student academic performance with and without IEP (i.e., no differences in performance ratings were found for students on IEPs when compared to those who were not on IEPs). It is evident that oral language abilities were superior to other communication skill sets such as reading and writing. Skills required for math, on the other hand, were underdeveloped in comparison. Thus, teacher ratings of performance did not correspond to objective measures of performance. That is, teacher grade assignments were unrelated to and did not predict student performance on several subtests of the WIAT-II. Teacher assignment of higher or lower grades did not predict similar outcomes on the WIAT-II (i.e., the student achieves higher or lower scores on the WIAT-II), with the exception of oral language and writing for the students on an IEP. Importantly, at least some of this discrepancy could be accounted for due to teacher knowledge of ABI.

As predicted in the second hypothesis, discrepancies existed between educator ratings of social competency when compared to student ratings. When examining inclusive environment, several trends were evident. IEP and teacher knowledge were important for students' life satisfaction in the domains of friendships and school, such that the higher the teacher knowledge of ABI, and in the absence of formal identification in school, the better students rated their life satisfaction on measuresof friendships and the

lower their reported stress levels. Alternatively, students identified with and IEP were significantly hindered in social adjustment. Furthermore, independent of IEP, all students reported difficulties with personal adjustment, particularly if the educator was not knowledgeable about ABI. Interestingly, students who were provided with accommodations and had an educator who was not knowledgeable about ABI reported more emotional symptoms and social stress/adjustment. When educators'evaluation externalizing behaviour and school problems was considered, it was evident that teachers who have low ABI knowledge had a greater likelihood to report externalizing behaviours and school problems in students with ABI, particularly if they were identified with an IEP. These ratings were at the clinically "at risk" level and corresponded to student ratings of perceived social stress, sense of control (LOC), and personal adjustment (scores also at the clinically "at risk" level). Post hoc analysis revealed that independent of ABI knowledge and presence of IEP, educators do not vary in their instructional approaches; however there was variability suggesting preference for some strategies over others for each group respectively. A descriptive analysis of the proportional use of selected strategies by teachers who are knowledgeable about ABI yielded interesting stylistic preferences compared to their cohort. The remainder of the chapter will discuss these results in terms of the implications it has on school reintegration for children with ABI.

Academic Challenges Associated With ABI

This research revealed that some discrepancies exist between educator ratings of student performance and their students' competency on measures of academic ability. These findings illustrate that students differ in their ability to perform in the classroom relative to how they are evaluated. Perhaps students do not have the neurocognitive

capacity to approach academic workload, but with appropriate strategies in place (i.e., knowledgeable teacher and strategies) may reach their potential. Since students are returning to school and adjusting to the changes associated with ABI, it is important that educators recognize the cognitive challenges that are coupled with ABI that in turn influence learning. Educators and students spend the majority of their day together, teachers are often the first to recognize when learning milestones are not met, and they identify the need for accommodation and identification review (Dworet, & Bennett 2002). However, in many ABI cases, communication skills are often quick to recover; therefore learning challenges may not appear evident. Without the advocacy of the family and medical team, children may not be identified with difficulties despite the neurocognitive challenges that may interfere with learning. Similarly, parents and caregivers may not recognize the implications ABI has on learning for the reason that they are not as familiar with their child in that particular context, and are more apt to identify with the emotional and behavioural symptoms after brain injury (Gfroerer, Wade, & Wu, 2008).

In addition to the fatigue and the physical symptoms associated with recovering from injury, there are several neurocognitive domains that are disrupted with ABI and can interfere with learning novel material. These domains may include paying attention, concentration, memory, distractibility, and impulsivity, and may be overlooked as a result of other gains the student has made. Injuries to the frontal cortex may also interfere with executive functions such as initiation, planning, and organization (Blosser&DePompei, 2003). Greater sense of life satisfaction is reported when teachers appear to understand students and respond in a supportive and encouraging manner. On the other hand, students with ABI can quickly identify with changes to their cognition, and without a

quick acknowledgement of these changes from the educator, appropriate accommodations may be delayed for some students,resulting in decreased satisfaction with reintegration and school inclusion (Rødset, 2008).

Since students do not differ for the most part in their appearance or ability to communicate postinjury, parents report that educators believe extra classroom support is not warranted (Hermans, Winkens, Winkel-Witlox, & van Iperen, 2012), Similarly qualitative reports from parents in this research, indicate that parents wish not to have their students "labeled" and segregated as a function of their injuries. Of the exceptionalities listed for the students on an IEP in this research, ABI (with the exception of one student) was not one of them. If additional informal support is offered for students who have an educator aware of TBI, these strategies and injury awareness may not be carried over into later years, particularly as classroom teachers alternate.

The outcomes of the current research also found that students who have sustained an ABI prior to beginning school, were more frequently identified with learning challenges and provided with accommodations at an early age. Students who have a disruption to development due to ABI in later childhood and youth often require accommodations; however, their challenges may go undetected due to their preinjury capacity or lack of knowledge that is shared with the school in terms of the students' injury and implications it has on learning.

Social Competence and Sense of Inclusion

Children in Canadian classrooms are introduced to social networks during very early years of development. Educators in Ontario, as evidenced in this research, are responsible for upwards of 30 students per day. This has implications for both teaching

strategies used, and the culture of the social environment. School culture influences the maturation of the autonomous self as well as the development of one's role in one's environment. Cognitive functioning and social participation are improved for students with TBI who return to supportive and nurturing environments. When students are accepted in their community (i.e., educators and peers), they are more likely to welcome support and participate in activities (Wells, Minnes, &Phillips, 2009).

The outcomes for students who begin school with acknowledged challenges areoften times different when compared to students who develop newfound difficulties due to injury. Parents of students with ABI report that in addition to physical and cognitive challenges, the reduction in social networks has emotional and social repercussions for their children (Hermans, et al., 2012). ABI can lead to a variety of challenges and changes with respect to emotion, cognition, behaviour, and sense of self that can largely influence self-esteem. Recent literature indicates that self-esteem is socially based and lower in children who have sustained TBI (Hawley, 2012). It was noted that children with TBI who have a higher sense of self-esteem also have fewer emotional and behavioural problems. Students with TBI often lose friends for a variety of reasons (i.e., lengthy hospital stay, change in personality, etc.), while others are able to maintain close friendships, which is reported to predict some students' return to school (Gauvin-Lepage& Lefebvre, 2010). The way in which educators respond to students with additional learning needs in the classroom also influences student judgment. When students feel as though they are centered out as a result of (in)ability (i.e., "don't be so noisy, Johnny can't concentrate beside you"), students with ABI can be made to appear more inferior to their classmates and consequently made to feel more inferior(Rødset,

2008), which negatively influences self-esteem, increases social stress and feelings of inadequacy, as well as increases the vulnerability others may respond in a less supportive manner.

Labeling students with “special needs” also has implications for self-esteem. Taylor, Hume and Welsh (2010) identified that students who had a “special needs” designation also had lower self-esteem levels and were more vulnerable to negative peer, teacher, and parent evaluations of their academic difficulties as well as were more likely to be socially excluded from activities. This may provide insight to the findings in the current research that illustrate students on an IEP experience more social stress than those who are not identified, or “labeled.”It is beneficial for students with learning challenges, in this case ABI, to develop secure peer networks as the social support facilitates with personal adjustment (Knesting, Hokanson, & Waldron, 2008).

School policies and procedures influence the school culture and, in turn, how students with disabilities and/or challenges are treated in the classroom, as well as the extent to which they are able to participate in a wide range of all school activities. Children with learning challenges in inclusive schools have been found to be more socially accepted than those in the less inclusive schools, and more so at the intermediate grade level (Townsend, Wilton, &Vakilirad, 1993). Students’ positive attitudes may stem from integrated learning and activities and/or from the influence of the teacher and principal.

Sense of school community, value, and inclusive leadership (principal's role in policy and practice) are variables that are important for sense of school inclusion (Zollers, Ramanthan, & Yu, 1999). Zollers et al. (1999)highlight the importance of inclusion

beyond the student. Inclusion is not simply about ensuring the student feels included in the classroom;it encompasses the notion that when faculty and students alike are equally treated and respected within their school community regarding knowledge, privacy, and practice, a more positive school culture is formed, with positive outcomes for students and faculty.

Educator Knowledge and Identification

Since educators scaffold academic and social development, it is important that they are informed of the consequences that neural disruption can have on development and,of particular interest, ABI. Academic and social competency were also investigated as a function of teacher knowledge about ABI as well as whether or not the student was identified upon his or her return to school postinjury. It was found that independent of teacher knowledge about ABI and/or identification of ABI as indicated by the implementation of an IEP, teaching strategies did not differ. This reason, in particular, may dictate the minimal differences found between emotional and social competencies. Although educators are knowledgeable about ABI, they lack the knowledge and skill set of the strategies available to employ in the classroom for children with ABI. While there were no differences in teaching acknowledgement using the full spectrum of instructional approaches, it was evident in this research that that there was a tendency for educators with knowledge about ABI to use interpersonally engaging strategies more frequently, actively involving the student in his or education. Alternatively, educators without ABI knowledge more frequently utilized strategies that were nonverbal and indirect (i.e., leaving directions on the desk).

Finally, it is important to identify the students' needs immediately upon return to school, since the "wait and see" approach is not effective in determining whether or not the student will experience challenges, because symptoms are longterm (Gfroerer et al., 2008). Waiting to determine whether effects of ABI may have negative repercussions to emotional reintegration and self-adjustment will leave students less likely to feel included in the classroom.

Students are returning to school after sustaining serious neurological trauma that leads to changes in development, day-to-day function, as well as having repercussions for academic, emotional, behavioural, and social adjustment. Since ABI results in a disruption to daily living, and school is the primary daily responsibility of school-aged youth, ABI can present several challenges for these students' return. As ABI is not a designation in the Ontario education system, structured evaluation of performance upon return is not available and, as such, students may not be receiving the support they need to facilitate and overcome challenges in academic and social development. Since academic and social abilities are best observed and evaluated in the classroom, it is important that students' neurocognitive capacity postinjury be taken into consideration. Implications for academic and social performance may result from the correspondence between learning in the classroom and other neuropsychological constructs (i.e., attention, memory, concentration, etc.) that may be compromised or underdeveloped as a function of ABI and/or stage of development.

Due to the effects that ABI (e.g., cognitive fatigue, headache, lack of motivation, etc.) has on the foundation of social and academic skills (i.e., reading, writing, language, and arithmetic), if challenges are not recognized early, later more advanced scholastic

learning and experiences will be disrupted. If students are not provided with the strategies to enhance these skills, it may have implications for later academic and postacademic(i.e., vocational) success. Not dissimilarly, social skills and the ability to interact with one's environment are also skills that are important, in and outside of the school to develop and maintain meaningful relationships that allow for the development of emotional skills and psychological stability. The maturity of these skills begins in the classroom at a young age concomitantly with autonomy and sense of belonging. Students begin to demonstrate skills and behaviours that allow them to play an active role in their lives and be contributors to their communities (school and neighborhood communities, clubs, sports, etc.). It is for these reasons that that the educator plays an important role in evaluating and incorporating strategies that allow the student to thrive as an individual.

The definition of special education has evolved over the years. Children with learning needs were (and in some cases still are) in segregated classrooms with modified curriculums adapted to their needs, while others focus on skills that are more self-oriented rather than academic oriented (i.e., vocational in nature) to facilitate managing in their environment (Zigmond, Kloo, &Volonino, 2009). Special needs has also meant having an educator who specializes in special education work one-on-one with students to meet individual needs, as well as has evolved to incorporate approaches towards inclusive education, such as having regular educators apply individualized programs in order to teach students the same curriculum (*No Child Left Behind Act*, 2001) rather than modifying the curriculum. Students with disabilities are now more commonly seen in regular classrooms with "helpers" as opposed to being segregated and labeled by being placed in separate rooms. Needs for students with ABI are based on their injury and

recovery. Unless identified with exceptionalities prior to their injuries, students with ABI will return to the regular classroom and, for the most part, to an educator unfamiliar with the ABI and/or how to identify the challenges as a result.

Knowledge Translation

Knowledge translation is important from several tiers. Students and families require information about the neurocognitive and psychosocial changes that will take place from the hospital to home. Families who are familiar with what to expect can inform the schools. In particular, the school psychologist should be part of the students' reintegration and IEP development (Semrud-Clikeman, 2010). ABI is not a designation in most of Canada as well as several other countries worldwide. Since impacts to the head can have immense long-term effects on all aspects of development, it should be recognized. Educators would then be required to have annual professional development on the topic in addition to the variety of other learning difficulties in the class so that, at the very least, classroom identification can take place.

The present research revealed that inconsistencies exist between teachers' knowledge of students' academic and social performance and their respective neurocognitive capacity. Neurocognitive capacity and development is reflected throughout behaviour and, as such, is apparent in students' work and social skills. Although correlations were not evident with school records of performance and standardized measures, interestingly, significant correlations appeared between educators' descriptions of students' functional reading, writing, and language abilities when compared to standardized language subtests of the WIAT-II. This indicates, not surprisingly, that written and oral communication are the best markers for educators in

determining a student's academic strengths/weaknesses. In terms of social skills, there were no relationships found between teacher and student ratings of social ability. This research found that students reported fewer symptoms of social stress and self-inadequacy when paired with a classroom teacher who is aware of the injury (both by teacher knowledge and IEP) and provides support. Alternatively, students report experiencing the most challenges (i.e.,psychosocial adjustment symptoms) when identified (with an IEP) and do not receive support from their educator as a function of their lack of knowledge.

Implications

The results of this research found that reintegrating to school for students with ABI have neurocognitive, psychosocial, emotional, and behavioural challenges that vary as a function of educator knowledge and identification. This research sheds light on the lack of knowledge school teachers have about ABI, yet provides some insight suggesting that educators who are knowledgeable about ABI are implementing strategies that are useful for students and are making some difference. Students are being misidentified in Ontario under an umbrella of exceptionalities, which indicates that some educators are aware of challenges with learning that exist, however lack the informed knowledge and resources to appropriately implement individualized strategies for these students. This research has several implications for knowledge translation, education, and recovery of function for academic and psychosocial health of students with ABI.

Implications for Practice

Overall, age at injury and being identified and appropriately accommodated for as well as having a teacher informed about ABI, are beneficial for academic achievement and social inclusion. Having an exceptionality recognized for ABI would increase the

probability that teachers would be explicitly taught about ABI during their education program/degree and be better prepared to facilitate the learning needs of students with ABI. Furthermore, this research has implications for the role of the school psychologist and his/or her much-needed insight and facilitation with the reintegration, knowledge translation, and psychosocial development of students returning to school with ABI. The education system may also benefit from professional development for educators from health care professionals who are involved in the rehabilitative goals of children with ABI, and the how meeting those goals (i.e., neurocognive, emotional, behavioural, etc.) overlap with activities in the classroom.

Implications for Theory

The results from the present study have implications for teaching practice, learning theories, and can provide insight to the emerging field of Educational Neuroscience. Understanding how the physiological changes during neural development influence educational and socioemotional development can improve knowledge, teaching practice, and pedagogy (Patten & Campbell, 2011). Similarly, understanding reintegration challenges for students with ABI contributes to scientific knowledge associated with the behavioural dimension (i.e., cognitive, emotional, social, etc.) of neurological compromise. Understanding brain and behaviour relationships in the classroom context may contribute to new models for teaching, learning, learning theories, and improved outcomes for academic and social development.

Suggestions for Further Research

Further research should consider using a larger sample size, as well as comparing strategies used for effective classroom practice/culture. In addition, subjective evaluations

of classroom performance can be supplemented with a qualitative interview process to ensure accuracy of ratings. In addition to correlational designs, future research could examine the differences across provinces between schools that recognize ABI as an exceptionality when compared to those that do not.

Further research should also examine a larger sample size in order to enhance the statistical power of the design and improve generalizability. Finally, there is also evidence for this study to warrant a more forensic examination of the strategies used, and specifically designed, for effective classroom practice/culture of students with ABI. In addition, subjective evaluations of classroom performance can be supplemented with a qualitative interview process to ensure accuracy of ratings.

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Appendix A

Research Ethics Board Clearance

Brock University
Office of Research Services
Research Ethics Office
St. Catharines, Ontario, Canada L2S 3A1
T: 905-688-5550, Ext. 3035/4876 F: 905-688-0748
www.brocku.ca

DATE: June 8, 2009

FROM: Michelle McGinn, Chair
Research Ethics Board (REB)

TO: Dr. Dawn GOOD, Psychology & Centre for Neuroscience
Karen McCafferty

FILE: 08-255 GOOD/MCCAFFERTY
Faculty Research

TITLE: School Reintegration for Children with Acquired Brain Injury

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The Brock University Research Ethics Board has reviewed the above research proposal.

DECISION: ACCEPTED AS CLARIFIED

This project has received ethics clearance for the period of **June 8, 2009 to December 31, 2011** subject to full REB ratification at the Research Ethics Board's next scheduled meeting. The clearance period may be extended upon request. ***The study may now proceed.***

Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and cleared by the REB. During the course of research no deviations from, or changes to, the protocol, recruitment, or consent form may be initiated without prior written clearance from the REB. The Board must provide clearance for any modifications before they can be implemented. If you wish to modify your research project, please refer to http://www.brocku.ca/researchservices/forms to complete the appropriate form Revision or Modification to an Ongoing Application.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-Council Policy Statement requires that ongoing research be monitored. A Final Report is required

for all projects upon completion of the project. Researchers with projects lasting more than one year are required to submit a Continuing Review Report annually. The Office of Research Services will contact you when this form *Continuing Review/Final Report* is required.

Please quote your REB file number on all future correspondence.

MM/an

Appendix B

Multidimensional Students' Life Satisfaction Scale (MSLSS)

Please circle number that best corresponds with your agreement to the statement.

1 = Never 2 = Sometimes 3 = Often 4 = Almost Always

1. I enjoy being at home with my family.
2. My family gets along well together.
3. I like spending time with my parents.
4. My parents and I like doing fun things together.
5. My family is better than most.
6. Members of my family talk nicely to one another.
7. My parents treat me fairly.
8. My friends treat me well.
9. My friends are nice to me.
10. I wish I had different friends.
11. My friends are mean to me.
12. My friends are great.
13. I have a bad time with my friends.
14. I have a lot of fun with my friends.
15. I have enough friends.
16. My friends will help me if I need it.
17. I look forward to going to school.
18. I like being in school.
19. School is interesting.
20. There are many things about school I don't like.
21. I wish I didn't have to go to school.
22. I enjoy school activities.
23. I learn a lot at school.
24. I feel bad at school.
25. I like where I live.
26. I wish there were different people in my neighborhood.
27. I wish I lived in a different house.
28. I wish I lived somewhere else.
29. I like my neighborhood.
30. I like my neighbors.
31. This town is filled with mean people.
32. My family's house is nice.
33. There are lots of fun things to do where I live.
34. I think I am good looking.
35. I am fun to be around.
36. I wish I lived in a different house.

37. I am a nice person.
38. Most people like me.
39. There are lots of things I can do well.
40. I like to try new things.
41. I like myself

Appendix C

Knowledge of Special Needs Questionnaire (KNSQ)

	Strongly Agree 1	2	3	4	Strongly Disagree 5
1. Ritalin is the best solution for individuals with ADD.	1	2	3	4	5
2. Persons with Tourette's syndrome can control their behaviour when given appropriate encouragement.	1	2	3	4	5
3. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away.	1	2	3	4	5
4. Most persons will recover from Autism.	1	2	3	4	5
5. A little brain damage doesn't matter since people only use a part of their brain anyway.	1	2	3	4	5
6. It is important to identify and address learning disabilities.	1	2	3	4	5
7. Emotional and behavioural problems take up most of a support worker's time.	1	2	3	4	5
8. A person who has a handicap also must have impairment.	1	2	3	4	5
9. Family members often do not acknowledge their family member's special need.	1	2	3	4	5
10. Complete recovery from a head injury is not possible, no matter how hard the person wants to recover.	1	2	3	4	5
11. People diagnosed with ADD are often very bright.	1	2	3	4	5
12. Persons with Tourette 's syndrome rarely act inappropriately.	1	2	3	4	5

13. A mild brain injury can affect a person's ability to concentrate, learn and function	1	2	3	4	5
14. Unwanted behaviours which are reinforced very time they occur are easier to extinguish than behaviours which are reinforced on a period but consistent basis.	1	2	3	4	5
15. Normal IQ scores after a head injury indicate that a person will have no trouble in other contexts.	1	2	3	4	5
16. There is more than one type of Down 's syndrome.	1	2	3	4	5
17. Head injuries affect a student's self-awareness and ability to regulate his/her own behaviour.	1	2	3	4	5
18. Persons affected by Autism need a lot of structure to draw them into classroom participation.	1	2	3	4	5
19. A brain injury heals with time and physical recovery is a sign that the brain has healed.	1	2	3	4	5
20. Persons diagnosed with conduct disorder have great difficulty following rules and behaving in a socially acceptable way.	1	2	3	4	5
21. Learning disabilities can be caused by a variety of factors.	1	2	3	4	5
22. Persons with Fetal Alcohol Syndrome are not at risk for psychiatric problems, criminal behaviour, unemployment, and incomplete education.	1	2	3	4	5
23. Too much time and attention are spent addressing students' special needs in the classroom.	1	2	3	4	5
24. Those diagnosed with Asperger's Syndrome typically display extremely high	1	2	3	4	5

intellectual abilities.					
25. After a head injury, it is usually harder to learn new things than it is to remember things from before the injury.	1	2	3	4	5
26. Persons with Fetal Alcohol Syndrome are usually small in size for gestational age or small stature in relation to peers.	1	2	3	4	5
27. The diagnosis of ADD is over used and applied to people who exhibit behavioural problems that may have other causes.	1	2	3	4	5
28. Those with Asperger's Syndrome display average to above average cognitive ability.	1	2	3	4	5
29. All learning disabilities can be addressed by similar strategies.	1	2	3	4	5
30. Skills are more likely to be retained by individuals with a brain injury if they are taught in the place in which the skill will be used.	1	2	3	4	5
31. Persons with Down 's syndrome have a particular personality type.	1	2	3	4	5
32. Applied Behaviour Analysis is the best known treatment for children with Autism.	1	2	3	4	5

Appendix D **Instruction and Behavioural Management Survey** *Please indicate the extent to which you <u>currently</u> use each of*			
1. Preferential seating assignment (e.g., sitting near the front of the room)			
the following types of approaches to manage a student with attention and/or behavioural difficulties in your classroom. 2. Modifying language used for instruction through repetition			
3. Modifying language used for instruction by keeping complex instructions short and simple (e.g., chunking)			
4. Modifying language used for instruction by pausing in between steps			
5. Using nonverbal cues (e.g., hand gesture) to keep student on task			
6. Providing concrete cues and supports (e.g., visual cues/ posters/ diagrams)			
7. Shortening assignments			
8. Using different student groups within a lesson (e.g., entire class versus groups of 3-4 students)			
9. Using a Daily Report Card – Home/School			
10. Chunking assignments into smaller sections			
11. Listing and modeling the steps for learning new information			
12. Promoting active engagement over passive engagement during a classroom lesson			
13. Providing student with explicit strategy instruction (e.g., learning strategies, note taking)			
14. Selective ignoring (e.g., ignoring certain behaviours)			
15. Simplifying instructions and giving them in a step by step manner			
16. Providing a peer tutor or study partner			
17. Proximity control (e.g., moving close to the student)			
18. Pre-teaching new vocabulary for every new topic			

	Rarely	**Sometimes**	**Most of the time**
19. Providing advance organizers for content			
20. Teaching student how to organize or plan			
21. Providing positive teacher attention (e.g., praise, encouragement)			
22. Providing written directions as well as oral directions			
23. Using choral response techniques (e.g., response cards, thumbs up)			
24. Teaching appropriate behaviour (e.g., social skills) and rehearsing it with the students			
25. Providing student with guided notes for content			
26. Monitoring teaching language for vocabulary, sentence length and meaning complexity			
27. Adjusting materials for student (e.g., adding colour, more structure)			
28. Highlighting key points in lesson for student			
29. Providing students with alternative formats in which tests or assignments are completed			

Appendix E

Medical Information

Medical Information

Assigned Identifier
: _____

Parent/Guardian: Please fill out this form to the best of your ability:

Child's Birthdate: _____

Date of injury: _____

Age of child at time of injury: _____

Date of Hospital Admission (if different from date of injury):
_____

Date of Hospital discharge: _____

Date of admission to the Treatment Centre: _____

Date of Treatment Centre discharge (if applicable): _____

Level of Consciousness: Length of unconsciousness following the injury:

- Number of days/weeks/months (circle one): _____
- If less than 24 hours, how long: _____
- None: _____
- Glasgow Coma Scale rating at time of injury: _____ Additional Ratings:

  _____

Memory Loss: Length of experienced memory loss following the injury:

- Number of days:_____
- If less than 24 hours, how many hours: _____
- Not at all: _____

Cause of the injury:

- ❑ Driver of an automobile in an accident
- ❑ Passenger of an automobile in an accident
- ❑ Motorcycle accident
- ❑ Near drowning
- ❑ Struck by auto while walking
- ❑ Struck by auto while bicycling
- ❑ Bicycle fall (no auto involved)
- ❑ Sports; please specify _____
- ❑ Other type of fall, please specify: _____
- ❑ Victim of assault
- ❑ Other, please specify: _____

Site of injury (please be as specific as possible):

_____

_____

Secondary mechanisms of the trauma that occurred:

- ❑ Infection: Systemic □ or Localized □
- ❑ Blood loss Transfusion required? _____
- ❑ Neural swelling Date of CT or MRI Scan:

  _____
- ❑ Other, please specify: _____

When the student regained consciousness, were there any instances of the following:

- ❑ repeated vomiting or nausea
- ❑ convulsions
- ❑ dilation of one or both pupils
- ❑ slurred speech
- ❑ aphasia
- ❑ weakness or numbness in the limbs
- ❑ loss of coordination
- ❑ confusion
- ❑ restlessness
- ❑ agitated or irritable
- ❑ Other: _____

Other information that will be relevant to this study:

_____